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A C T A P A L A E O N T O L O G I C A P O L O N I C A
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JAN STACH

AGRIOTHERIUM INTERMEDIUM N. SP. FROM THE PLIOCENE BONE BRECCIA OF WĘŻE

Study on the Tertiary bone breccia Fauna from Węże near Działoszyn in Poland

PART VIII *

Abstract. — The writer describes fragments of dentition of *Agriotherium* Wagn. (= *Hyaenarctos* Falc. & Cautl.) from the Pliocene bone breccia recovered at Węże near Działoszyn, Poland. He refers these remains to an individual of a new species from genus *Agriotherium intermedium,* which occupies an intermediate systematic position between *A. insigne* (Gerv.) from Montpellier in France and *A. sivalense* (Falc. & Cautl.) from Siwalik in India, in what concerns the shape of the crown of molars, that of M^2 in particular.

DESCRIPTION OF MATERIAL

The bone breccia discovered at Węże near Działoszyn from which the writer has already described *Arctomeles pliocaenicus, Ursus wenzensis* and *Nyctereutes* sp.[1], all belonging to the group of carnivores, has also yielded the remains of *Agriotherium* (= *Hyaenarctos*), another carnivore whose size greatly exceeds that of any other animal forms associated with the said breccia.

The remains here considered are small, mostly detached fragments, mainly referable to one individual.

1) The largest of these remains is a fragment of the right upper jaw, showing remnants of the fourth premolar and the first and second molars in a damaged condition.

The other remains consist of:

2) lingual edge of crown of left upper second molar (M^2);

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* Parts I-V — see *Acta Geol. Pol.*, vol. II-V/1952-55; parts VI-VII — *Acta Palaeont. Pol.*, vol. I/1956.

[1] *Arctomeles pliocaenicus* n. gen. & sp. from the Melinae subfamily. *Acta Geol. Pol.*, vol. II/1951. *Ursus wenzensis,* new species of a small Pliocene bear. *Ibid.*, vol. III/1953. *Nyctereutes* (Canidae) in the Pliocene of Poland. *Ibid.*, vol. IV/1954.

3) broken off external cusp of right upper first molar (M^1);

4) posterior portion of the right upper fourth premolar (P^4);

5) fragment of left mandible with remnants of lower fourth premolar (P_4);

6) a detached, well preserved lower third incisor (I_3);

7) a likewise beautifully preserved complete left lower first molar (M_1);

8) right lower first molar (M_1), slightly damaged.

The fragment of right maxilla, mentioned at the head of the here specified remains, is, by far, the most diagnostic specimen.

The upper fourth premolar of this fragment of maxilla is badly damaged, the crown and the anterior part being altogether missing. The outline of the base of the crown in the posterior end of tooth, however, as well as the outline of its root are discernible. Not much inference can be drawn from this tooth as regards its shape and size. The only conclusion of some probability is that the length of the tooth had been 29 mm. In this it agrees with the size ascertained for that same tooth in *Agriotherium insigne* (Gerv.) by Ch. Frick (1926—30). The figure of the 29 mm length has been obtained by taking into account the 12 mm length of the broken off posterior cusp (metacone) of the tooth under item 4, and by comparing it with the same cusp in *A. insigne* (Gerv.) from Montpellier which is likewise 12 mm long, as figured by Frick (1926-1930, fig. 20) in a natural size drawing of the complete crown of the upper fourth premolar.

The upper first molar (M^1) in this fragment is likewise in a very poor state of preservation, as all the four cusps are missing, having been partly broken off after the animal had perished and partly worn down, namely in the lingual side of the crown. On the preserved base of crown, however, it is possible to recognize its outline and measure its size. The base shows to be of sub-quadrate shape with corners somewhat rounded. Externally the tooth is 26 mm long, 25 mm medially and 22.2 mm internally. The crown of the tooth is thus narrower lingually and with inner border more rounded. The crown, as measured at mid-tooth length is 25 mm wide. The size of the external posterior cusp (metacone) in this tooth may be figured out by measuring the broken off cusp of another M^1, under item 3. This cusp, as measured externally, is 15 mm high including the cingulum, 10 mm without the cingulum, and 13 mm wide. The summit of the cusp is pointed, the edges conspicuous, the surface wrinkled, this being better recognizable on the external side of the cusp.

The upper second molar (M^2) is in a far better state of preservation, the paracone and the external border only being missing. Perfectly preserved are its second external cusp (metacone) and the whole lingual

part of the crown, including the cingulum, and the ridge running lengthwise through the centre of the tooth. The crown of this tooth is likewise sub-quadrate in shape, with rounded angles. The length here is 23.5 mm externally, 24.5 mm at mid-length and 25.2 mm on the lingual side; the width is 26 mm anteriorly, 25 mm medially and 24 mm posteriorly. These three dimensions are only approximate since the external border has not been preserved and only the transition of the root into the crown is anteriorly well discernible. The height of the metacone as measured externally, without the cingulum, as this is missing, is 6.8 mm, the length of the edge descending lingually is 8 mm, that of the posterior edge, measured to the inner border of the here present cingulum, is 9 mm. The cusp is in the shape of an almost regular pyramid, with well showing anterior, lingual and posterior edges, and finely wrinkled surface. This cusp was separated from the anterior cusp (paracone) by a rather prominent depression. A gently curving rib, in the shape of a diagonal extending lingually to the posterior angle of the square, and well preserved over its complete length, branches off from the posterior border of the missing paracone. It is difficult to indicate the exact position of the lingual cusps on this rib. The greatest height, 3.8 mm, is attained by the rib medially, opposite to the depression separating the paracone from the metacone. It is also here that the rib attains its maximum width of 6.5 mm, while at its initial and terminal part it is 3.8 and 3 mm respectively. An elongated, more or less triangular area separates the rib along its entire length from the sharply outlined border of crown, formed by the cingulum. This flat area is covered by densely arranged but shallow wrinkles. There is no lingual extension whatever of the posterior end of the crown, i. e. no talon. The circumference of the tooth consists of a single cingulum, particularly high (6.8 mm) on the lingual side of the crown.

A detached fragment of the lingual edge of the left upper second molar (item 2) is probably referable to the same individual even though its length (26.5 mm) exceeds somewhat that of the lingual border of the just described M^2. In this fragment also is the dense transverse wrinkling readily recognizable over the surface separating the rib from the cingulum.

A fragment of the left mandibular branch has been recovered consisting of a part extending from the posterior end of the canine to the beginning of the first molar (M_1). The length of this fragment is 48 mm, the height — 51 mm. Of the dentition a trace of the lower third premolar (P_3) has been preserved, with fragment of a single root embedded in a rather small alveolus, 5 mm in diameter, also of the lower fourth premolar (P_4) directly adjacent. It is this remnant of the fourth premolar

which made it possible to ascertain the exact length of the tooth to be 18 mm and its maximum median breadth as 10 mm. The area between the canine tooth which is missing here, and the alveolus of the third premolar does not show any trace of teeth.

Very well preserved is the crown of a detached left lower third incisor (I_3). In shape it markedly resembles the crown of this incisor in bears. A smaller accessory cusp branches off laterally towards the canine from the main shaft of the crown. It is externally separated from the central shaft by a shallow groove, while lingually three ribs descend from the summit of the crown to its base, namely along the inner edge of the shaft, medially, and from the external edge, uniting at the base of the crown. The height of the central shaft measured externally from the base of the crown is 17.5 mm, that of the side branch 13 mm; the summit of the shaft overtops by 4.5 mm the summit of the side cusp. The width of the crown measured at the base is 11 mm, while the thickness of the tooth at its base is 12 mm.

In a very satisfactory state of preservation are also two detached specimens of the right and left mandibular first molars. They both, probably, belonged to the same individual as they differ neither in shape nor in dimensions. Their size is rather large, the basal length of the crown being 37 mm, frontal width 17.5 mm, that in the middle along the line of the central cusp (protoconid) 18.7 mm, while at the end, within the talonid, it is 20.5 mm. The principal cusp (protoconid), which is strongly developed, attains 21 mm when measured from the lower border of the cingulum on the outside. Its basal width is 16 mm, the length 14 mm. A distinct narrow ridge, 10 mm long, runs from the summit anteriorly, uniting directly with the posterior ridge of the preceding anterior cusp. The shorter (4 mm) posterior ridge bifurcates only just a little below the summit to form two sharply outlined ridges, 8 mm in length, which encircle the flat triangular posterior wall of the cusp, steeply descending to the depression of the talonid. The lateral external ridge is poorly discernible, whereas numerous fine wrinkles are well shown at this side, arranged almost parallel to each other, from the summit to the cingulum. The anterior cusp, the paraconid, measured at the base, is 12 mm thick and 11.5 mm long. Its height measured from the lower margin of the cingulum is 15 mm. It shows only two distinct ridges, the anterior one descending from the summit to the base where it unites with the cingulum, and the posterior one, 6 mm in length. The external surface of that cusp is also finely wrinkled. On the lingual side the summit of the metaconid rises beyond the main cusp. Its height measured internally from the lower margin of the cingulum is 13.5 mm, while measured from the side of the talonid it is 6.5 mm; the meta-

conid is 7.75 mm long. Anteriorly the metaconid touches the base of the large protoconid, forming with it and with the posterior cusp the trigonid, 28 mm long. Really it forms the beginning of the internal delimitation of the talonid. Beyond it, on the lingual side is the conspicuously lower entoconid, with height of 10 mm measured from the lower margin of cingulum, followed by the still lower entoconulid, which partially closes up posteriorly the talonid by its arcuate low summit ridge. The hypoconid rises externally, opposite the two last small lingual cusps. Its height measured externally from the lower margin of the cingulum is 14.5 mm, that measured from the talonidal depression being 6 mm; its thickness is 12 mm, the posterior summit ridge is 5.8 mm long, while the anterior, reaching to the base of the cardinal cusp is 8 mm long. No cusp or thickening is discernible on this ridge.

The talonid, being thus lingually delimited by three cusps — the metaconid included — and labially by the hypoconid and its anterior ridge, is relatively broad and rather long. The cingulum surrounding the crown at the base is high (7 mm) on the outer side, below the hypoconid, that is to say posteriorly. It is, however, relatively weakly marked, near the summit it ascends and becomes almost entirely obliterated, to be again, though very indistinctly discernible, near the anterior cusp. Lingually the cingulum is almost completely obliterated.

GENERIC AND SPECIFIC DETERMINATION

The shape and size of the here described teeth lead with perfect surety to the inference that they formed part of the dentition of an individual belonging to a group of species originally known under the common generic name of *Hyaenarctos* (Falconer & Cautley).

Remains of an individual from this genus were first recovered from Pliocene deposits in the Siwalik Hills of India. They consisted of a strongly damaged right mandible with P_4, M_1 and M_2, also with alveoli referable to two premolars and M_3, which are all missing. The next find was that of part of a skull with preserved canines, P^4-M^2 in a damaged condition, and alveoli of P^2-P^3. These remains were in 1836 described by H. Falconer and Cautley and referred by them to the skeleton of a bear which they called *Ursus sivalensis* Falc. & Cautl.

The authors themselves, and later in 1837 also A. Wagner, laid emphasis on the dentition of the described specimen not agreeing with that typical of the genus *Ursus*, so much so that the generic name of *Agriotherium* was suggested by A. Wagner for the individual from the Siwalik Hills. Some time after the name of *Hyaenarctos* Falc. & Cautl. was introduced for that genus by R. Owen who asserted that the authors had

originally intended to call their specimen by this name guided by the resemblance in shape of P^4 to that tooth in the hyena. This name, accepted by H. Falconer (1848) as subgeneric for this type of fossil mammal, has been since used by palaeontologists as generic.

Genus *Hyaenarctos* (Falc. & Cautl.) has been subsequently split up into genus *Agriotherium* Wagn. with *Agriotherium sivalense* (Falc. & Cautl.) as genotype, genus *Indarctos* Pilgrim with *Indarctos salmontanus* Pilgrim as genotype, and subgenus *Hyaenarctos (Lydekkerion)* Frick which has not been generally accepted, with *Hyaenarctos palaeindicus* Lydekker as genotype.

The main differences between *Agriotherium* Wagn. and *Indarctos* Pilgr. lie in the shape of dentition, of the upper jaw particularly. They have been summed up by Ch. Frick, W. D. Matthew, G. E. Pilgrim and others. The chief ones are as follows:

1. In *Indarctos* Pilgr. the anterior external accessory cusp, the parastyle, on P^4, is poorly developed while it is prominent in *Agriotherium* Wagn.; in *Agriotherium* this tooth is large and longer than the next molar, M^1.

2. In *Indarctos* Pilgr. the basal section of M^1 is sub-quadrate, while in *Agriotherium* Wagn. the lingual border of the crown is shorter than the labial and with angles distinctly rounded.

3. In *Indarctos* Pilgr. the labial posterior border of M^2 extends into a more or less prominent talon, while in *Agriotherium* Wagn. there is no talon on this tooth.

4. In *Indarctos* Pilgr. M_1 is relatively long, with the talonid somewhat shorter than the trigonid, and the hypoconid lower than the entoconid, while in *Agriotherium* Wagn. M_1 is relatively short, with the talonid markedly shorter than the trigonid, and the hypoconid higher than the entoconid.

On differences of dentition, as here specified, between *Agriotherium* Wagn. and *Indarctos* Pilgr. one is with perfect surety led to the inference that the described remains belonged to the skeleton of an individual from genus *Agriotherium* Wagn. Namely:

1) M^1 is with the lingual border distinctly shorter than the labial and with angles rounded;

2) the lingual posterior border of M^2 displays no posterior convexity, which means that the crown is without a talon;

3) the anterior part of M_1, the trigonid, is considerably longer than the posterior, the talonid; the crown of this tooth is largest within the talonid, and the hypoconid is higher than the entoconid.

It is far more difficult specifically to identify the remains of *Agriotherium*, found in the Węże breccia.

The paucity of remains thus far recovered from diverse sites, in most cases consisting of the detached upper or lower jaw only, has sometimes prevented their undoubted identification with this or another species of *Agriotherium* Wagn. or of *Indarctos* Pilgr.

For this reason such remains were mostly referred to some species within the group of *Hyaenarctos* without generic differentiation into *Agriotherium* and *Indarctos*. In this way, a score or so of species have been established — part of which are probably identical — or they were simply called *Hyaenarctos* sp.

The recovery, therefore, from the same deposits, within so small an area as that occupied by the Węże breccia, of fragments of both the upper and lower dentition of an individual, undoubtedly referable to one species from genus *Agriotherium*, provides important evidence for the knowledge of the dentition of this species.

Since dental dimensions serve as supplementary evidence in specific diagnosis and since the group of forms known under the common name of *Hyaenarctos* has a very wide range of distribution within the Holarctic area, it seems most advisable to tabulate data concerning the dimensions of the here studied teeth in species thus far identified from the general group of *Hyaenarctos* (see table on p. 8-9).

A review of the species listed in the here annexed table shows the predominance, within the entire Holarctic area, of species referred by their authors to genus *Indarctos* Pilgr. The predominance would, perhaps, be still greater, should the upper second molar be always present in the remains of forms belonging to the *Hyaenarctos* group, recorded from different sites. On the presence or absence of a talon in this tooth, the remains could without doubt be referred to some species within genus *Indarctos* or *Agriotherium* respectively. Species tentatively determined as *Hyaenarctos* sp. would then also disappear from the list.

The assignment of a form to genus *Agriotherium* or to genus *Indarctos* on the first molar only, does not always seem quite justified to the writer. A comparison for example of this tooth, collected from the Węże breccia, with the same tooth recovered from the island of Samos, the shape of which is excellently shown on photographs in a paper by H. Helbing (1932, fig. 3 a-b), here reproduced in pl. II, fig. 5-6, shows their almost identical similarity. In both, the hypoconid is higher than the entoconid and a distinct entoconulid is present in addition to the entoconid. And yet, on the absence of talon in the upper second molar in the Węże specimen, it is genus *Agriotherium*, while the presence of a prominent talon in the same tooth belonging to the Samos specimen refers it to genus *Indarctos*.

The following are, after Ch. Frick (1926-30), species undoubtedly referable to *Agriotherium* Wagn.:

Table showing dimensions of P^4, M^1, M^2 and M_1 in species within the group of *Hyaenarctos* (in mm)

Species	P^4	M^1	M^2	M_1	Patria	Genus
intermedium n. sp.	-	25 × 25	24.5 × 25	37 × 20.5	Węże, Poland	Agr.
insignis Gervais, 1853	29.1 × 21	27.8 × 27.5	27.4 × 26.5	41.5	Montpellier, France	„
insignis Gervais, 1853		—	–	40 × 22.5 38 × 21.5	Boutonnet, France	„
sp. Helbing, 1932	—	–	24 25.2 × 28.5	—	Vialette, France	„
sp. Gervais, 1853	30 × 23	--	-	-	Alcoi, Spain	Agr.?
sp. Flower, 1877	—	30 × 30			Felixtow, England	Agr.?
ponticum Kormos, 1913		—	—	41 × 19.5	Baltavár, Hungary	Agr.?
laurillardi Meneghini, 1863	—	-	—	33	Monte Bamboli, Italy	Agr.?
arctoides Depéret & Lleuca, 1895	24.6	24.6 × 22	28.2 × 22	25	Orignac, France	Ind.
arctoides Depéret & Lleuca, 1895	27 × 21	27 × 23.5	29 × 21 30 × 24.5	—	Montredon, France	„
atticus Dames, 1883		–	—	40	Pikermi, Greece	„
vireti Villatta & Crusafont, 1943		—	-	—	Vallés-Penedés, Spain	„
sp. Helbing, 1932	29.1 × 24,3	29 × 27	26 34 × 26	41.6 × 22.2	Samos, Greece	„
sp. Tobien, 1952	—	—	25.1 × 18.3	—	Gau-Weinh. Germany	„
sivalensis Falconer & Cautley, 1836	32 × 22	29 × 29.9	29 × 30.5	38	Siwalik, India	Agr.
punjabiensis Lydekker, 1878	32 × 22.5	30 × 28	31 × 27 28 × 23	42.5 × 21.5	Siwalik, India	Ind.
palaeindicus Lydekker, 1878	—	27 × 25.5	27 × 27.5	39.5 × 21	Siwalik, India	Agr.

Table showing dimensions of P^4, M^1, M^2 and M_1 in species within the group of *Hyaenarctos* (in mm) *(continued)*

Species	P^4	M^1	M^2	M_1	Patria	Genus
naraghanus Mequenen, 1925	—	—	—	44 × 23	Maragha, Persia	Ind.
salmontanus Pilgrim, 1913	—	29 × 25.5	35 × 27	—	Salt Range, India	..
lagrelii Zdansky, 1924	27.3 × 21.4	27.3 × 25	32.6 × 23.4	37.5 × 20.8	Pao-Te distr. China	..
sinensis Zdansky, 1924	—	—	—	42.8 × 21.4	Pao-Te distr. China	..
sp. Lydekker, 1844	—	—	—	—	South China	Agr.?
gregori Frick, 1921	32.3 × 21.7 35.4 × 25.8 36.5	30.5 × 32.3	—	43.5 × 23.5	Eden, California	Agr.?
oregonensis Merriam, 1916	31.7 × 22.6	—	35.3 × 27.2	—	Oregon, USA	Ind.
schneideri Sellards, 1916	—	29.8 × 30.2	—	41 × 23.5	Florida, USA	Agr.?
sp. Matthew, 1918	—	—	26 × 24	—	Snake Creek USA	Agr.?
sp. Freudenberg, 1910	—	—	—	46.5 × 24	Tehuichila, Mexico	Agr?.

1) *Agriotherium insigne* (Gervais, 1853) (= *Hyaenarctos insignis* Gervais) from Montpellier in France;

2) *A. sivalense* (Falconer & Cautley, 1836) (= *Ursus sivalensis* Falc. & Cautl.) from Siwalik in India;

3) *A. palaeindicum* (Lydekker, 1878) (= *Hyaenarctos palaeindicum* Lydek.) from Siwalik in India;

4) *Agriotherium* sp. (Helbing, 1932) (= *Hyaenarctos* sp. Helb.) from Vialette in France.

The following are also regarded by Ch. Frick (*l. c.*) as belonging to *Agriotherium:*

Hyaenarctos sp. Gervais, 1853, from Alcoy in Spain (fragment of upper jaw with P^4 and a remnant of the anterior part of M^1);

H. „schneideri" Sellards, from Brewster, Florida, USA (M^1 only);

Hyaenarctos sp. Flower, 1877, from Felixstow near Waldringfield, east of England (M^1 from Red Crag only);

H. gregori Frick, 1921, from Eden in California, USA (damaged P^4 and M^1, also P_4-M_2).

Thus truly but one single species from *Agriotherium* Wagn. has been recorded from Europe, namely that of *Agriotherium insigne* (Gerv.). This species has been established on fragment of the upper jaw, with partly preserved dentition, belonging to one individual from Montpellier. P. Gervais, when describing the dentition of this individual, also published in 1853 and 1859 a natural size drawing of the fourth premolar and of both molars. These are teeth with shape which offers particular interest owing to their comparability with the teeth of *Agriotherium* recorded from Węże. The lower dentition of *A. insigne* (Gerv.) was, on the other hand, described in 1939 by J. Viret on evidence of three mandibular fragments collected from Boutonnet, Montpellier. Excellent photographs shown in table II, fig. 2 a-b of J. Viret's paper, enable a close comparison to be made of the shape of the first molar in *A. insigne* (Gerv.) with that of the same tooth in the Węże specimen.

For a better comparison of these teeth the following drawings are reproduced in pl. II of the present paper: upper dentition (P^4-M^2) in species *A. insigne* (Gerv.), *A. sivalense* (Falc. & Cautl.) and *A. palaeindicus* (Lyd.), M^2 in *Agriotherium* sp. (Helb.), and lower dentition (M^1) in *Indarctos* sp. Helb. and M_1 in *A. insigne* (Gerv.) described by J. Viret.

When comparing the size and shape of the maxillar molars in the Węże specimen with dimensions in other species of *Agriotherium* specified in the annexed table, also with the drawing of teeth by Ch. Frick included in his description of *A. insigne* (Gerv.), it is observable that the teeth in the Węże specimen are somewhat smaller and the crown in the better preserved molar somewhat differently shaped, to say:

1. The length of the anterior external cusp[2] in the Węże specimen practically equals that of the next cusp, the metacone (12.2 : 12 mm), the boundary line where their bases meet is at mid-length of the tooth, while in *A. insigne* (Gerv.) the anterior cusp is distinctly longer than the posterior (15 : 11 mm) and the bases of the cusps meet beyond the mid-length point of the tooth.

2. The anterior border of crown in M^2 of the Węże specimen is almost parallel to the posterior border, while in *A. insigne* (Gerv.) the borders are inclined to each other at an acute angle.

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[2] Though in the Węże specimen this cusp is broken off, we can see outlined there the course of the cingulum from the edge of which the measurements were made. The lingual edge of this cusp is discernible on the crown of the tooth, as well as the line where the base of this cusp meets with that of the next cusp, the metacone.

3. The posterior border of the tooth in the Węże specimen is almost perpendicularly disposed to the lingual border, with an inconspicuous depression at its mid-length, while in *A. insigne* (Gerv.) the posterior border is broadly rounded lingually and displays a distinct cavity upwards of its mid-length.

In many of these characters M^2 of the Węże specimen approaches the same tooth in the specimen from Vialette, by H. Helbing (1932) defined as *Hyaenarctos* sp. In the Vialette specimen, however, the rib extending obliquely over the entire length of the crown is quite distinctly divided into separate lingual cusps.

Much closer than to *A. insigne* (Gerv.) does M^2 in the Węże specimen come, as shape is concerned, to *A. sivalense* (Falc. & Cautl.), a species which J. Viret is inclined to identify with *A. insigne* (Gerv.). In *A. sivalense* (Falc. & Cautl.), however, there is some slight tendency to develop a talon, owing to which the lingual border of this tooth is somewhat longer than the labial (27 × 25 mm), according to dimensions shown by the drawing in Ch. Frick's paper.

The lower first molar is less diagnostic in the matter of comparison and specific identification. In the Węże specimen M_1 is 37 mm long, while its maximum width on the talonid is 20.5 mm; in *A. insigne* (Gerv.) these dimensions are not much greater, being after J. Viret (1939) 38-40 mm and 21.2-22.5 mm respectively. The tooth is, however, shaped somewhat differently, to say:

1. In the Węże specimen, on the lingual side of M_1, two distinct cusps rise in addition to the metaconid, that is the entoconid and the entoconulid, as an extension of this border of the crown. In *A. insigne* (Gerv.) the entoconulid is missing in this tooth, the entoconid only constituting besides the metaconid the lingual wall of the crown.

2. The cingulum of the crown on the labial side of the tooth is less prominent in the Węże specimen and it is not discontinuous as in the tooth of *A. insigne* (Gerv.).

The complete obliteration of the crown in M_1 belonging to the specimen of *A. sivalense* (Falc. & Cautl.) impedes the comparison of its shape with that of the crown in M_1 of the Węże specimen.

On the ground of differences of shape, observed in teeth just mentioned, belonging to the Węże specimen and those in *A. insigne* (Gerv.) and *A. sivalense* (Falc. & Cautl.), and also in consideration of the great geographical distance separating Węże from the Siwalik Hills in India which have yielded the remains of *A. sivalense* (Falc. & Cautl.), the present writer believes it advisable to assign an independent name to the Węże specimen, namely that of *A. intermedium* n. sp. Some lucky discovery of more ample material, at these or other sites, will perhaps in the future

lead to the knowledge of variations, if any, and of the extent to which they may have affected the shape of dentition in individuals from *Agriotherium* Wagn.

GENERAL REMARKS

Fossil remains belonging to animals from the group here considered and originally referred to under the common name of *Hyaenarctos* (Falc. & Cautl.) have been recorded from Spain, France, Great Britain (Felixstow near Waldfieldring), Germany, Poland, Hungary, Italy, Greece (Pikermi, island of Samos), Persia, China, India, also California, Nebrasca, Oregon, Florida in the USA, and Mexico. The area inhabited by this group of carnivores is thus seen to have been a vast one, since it extended over nearly the whole of southern and central Europe and stretched on eastward to Asia, occupying also wide territories within North America.

This suggests great similarity if not identity of living conditions of this group of animals, prevailing during a certain period of time over immense territories under the same geographical latitude. These environmental conditions were probably responsible for the development of geographic and ecologic forms showing no important differences.

Should only those forms from the common group be taken into account as are now referred to under the generic name of *Agriotherium* Wagn., still, the occurrence of *A. insigne* (Gerv.) in France, of *A. intermedium* n. sp. in Poland and of *A. sivalense* (Falc. & Cautl.) in the North of India (Siwalik) points out to the existence at one time of common links uniting very closely related forms, distributed along a track extending from France to India.

Some difficulties are encountered in determining the time of occurrence of the *Hyaenarctos* group. Geologists do not always agree as to the age of deposits from which fossil remains have been recovered referable to representatives of that group, the age assigned to them ranging from the Upper Miocene to the Upper Pliocene. Deposits which have yielded remains of *Agriotherium* are regarded as of Pliocene age and it is the Middle or the Upper Pliocene periods which appear to have witnessed the greatest specific abundance of this genus. Fossil remains of *Indarctos*, on the other hand, are more copious in the Lower than in the Middle Pliocene and *Indarctos* is by G. E. Pilgrim, H. Tobien and others regarded as the time-marker for the Hipparion fauna in the south of Europe and Asia.

The carnivores from the Węże bone breccia, which have thus far been given closer consideration, resemble fossil faunas recorded from the Montpellier deposits in France. Since the age of these deposits is now being shifted from the Lower to the Middle Pliocene it is hence to

be inferred that the remains of *A. intermedium* are likewise assignable the Middle Pliocene age.

Though the morphology of species of *Agriotherium* Wagn. comes quite close to that of *Indarctos* Pilgr. being probably referable to a common ancestor and to a contemporaneous date of origin and extinction, yet they constitute two independent stocks. Their ancestor is to be searched for in the Miocene among the multitude of small forms belonging to genus *Ursavus* Schloss. Differences of size excepted, the molars of *Ursavus* come so near in shape to those of *Indarctos* that some species of *Ursavus* were originally referred to *Hyaenarctos* (Falc. & Cautl.), as for example *Ursavus brevirhinus* Hofmann, 1887, by M. Schlosser in 1887 identified as *Hyaenarctos minutus* Schloss., and *Ursavus depereti* Schlosser, 1902 in 1895 by Ch. Depéret referred to *Hyaenarctos arctoidens* Dep.

Individuals from *Agriotherium* have sometimes attained considerable dimensions. The skull of *A. sivalense* (Falc. & Cautl.) is by R. Lydekker reported to have been 482.6 mm in length, which makes the size of the whole body of that form equal the dimensions of the largest individuals of the cave bear. The skull of *A. intermedium* n. sp. could not have been much smaller. Since, in *A. sivalense*, with length of M^1 and M^2 at 57 mm, the length of skull is 482.6 mm, then, with the same ratio applied to *A. intermedium*, in which the length of a number of teeth attain 51 mm, the length of skull would have to be 431.4 mm.

The strongly developed carnassials in all species belonging to the *Hyaenarctos* group indicate that representatives of this group were all carnivores with powerful bodies. The large size of the upper fourth premolar, shaped very much like that of the *Hyaena*, must probably have made easy the crushing of the biggest bones. The mode of life of *A. intermedium* may, therefore, have resembled that of hyenas. Its habitat was perhaps one of steppes with a few trees and bushes clustered here and there particularly in the vicinity of water reservoirs.

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JAN STACH

AGRIOTHERIUM INTERMEDIUM N. SP. Z PLIOCEŃSKIEJ BREKCJI KOSTNEJ WYDOBYTEJ Z MIEJSCOWOŚCI WĘŻE W POLSCE

Streszczenie

Autor opisuje szczątki *Agriotherium* Wagn. (= *Hyaenarctos* Falc. & Cautl.) z brekcji kostnej, wydobytej w miejscowości Węże koło Działoszyna (woj. łódzkie), pomiędzy którymi zachowały się stosunkowo dobrze pierwszy i drugi ząb trzonowy

górnej szczęki oraz nieuszkodzony pierwszy ząb trzonowy dolnej szczęki tego samego osobnika, dozwalające określić z wszelką pewnością rodzaj tego zwierzęcia.

Autor zestawia wszystkie (24) opisane dotychczas gatunki z pierwotnej systematycznie grupy *Hyaenarctos*, rozdzielanej obecnie na dwa rodzaje: *Agriotherium* Wagn. i *Indarctos* Pilgr., podając, według danych zaczerpniętych z prac różnych autorów, rozmiary zębów P^4 - M^2 górnej szczęki i M_1 dolnej oraz miejsca znalezienia tych gatunków.

Szczegółowe porównanie zębów trzonowych osobnika znalezionego w Wężach wykazało, że należy go zaliczyć do rodzaju *Agriotherium* Wagn., bowiem brzeg dojęzykowy korony pierwszego zęba trzonowego górnej szczęki jest u tego osobnika krótszy niż brzeg zewnętrzny, gdy tymczasem u *Indarctos* Pilgr. przekrój podstawy korony tego zęba jest niemal kwadratowy, a w drugim zębie trzonowym M^2 brak zupełnie talonu, który u *Indarctos* jest na tym zębie mniej lub więcej wydatnie wykształcony.

Nieco trudniej określić dokładnie gatunek *Agriotherium* znalezionego w Wężach. Dotychczas z pliocenu Eurazji poznano cztery gatunki, które na podstawie kształtu zębów trzonowych zaliczono do rodzaju *Agriotherium* Wagn. Autor porównuje kształt zębów okazu z Wężów z kształtem zębów tych czterech gatunków i dochodzi do przekonania, że pomiędzy tymi zębami zaznaczają się wyraźne różnice. Okaz z Wężów pod tym względem zajmuje jakby pośrednie stanowisko pomiędzy *A. insigne* (Gerv.) poznanym z Francji (Montpellier) a *A. sivalense* (Falc. & Cautl.) z Siwalik w Indiach. Dla zobrazowania różnic występujących w kształcie zębów trzonowych pomiędzy osobnikiem z Wężów a innymi gatunkami, autor zestawia na pl. II kształt zębów czterech pokrewnych gatunków *Agriotherium* Wagn. według rycin, podanych w opisach tych gatunków przez innych autorów. Autor nadaje gatunkowi z Wężów nazwę *Agriotherium intermedium* n. sp.

Obszar zamieszkały przez grupę zwierząt obejmowanych wspólną nazwą *Hyaenarctos* był bardzo rozległy, zajmował bowiem niemal całą południową i środkową Europę, łączył się dalej ku wschodowi z siedzibami ich w Azji i rozprzestrzeniał się szeroko w Ameryce Północnej. Pozwala to przypuszczać, że w pewnym okresie czasu warunki życiowe na dużej przestrzeni w Holarktyce, przynajmniej w pewnej szerokości geograficznej, były dla tej grupy zwierząt o ile nie jednakowe, to bardzo do siebie zbliżone, i dawały początek powstawaniu form geograficznych czy ekologicznych mało się od siebie różniących.

Jeżeli nawet z tej wspólnej grupy wyłączymy formy, obejmowane obecnie nazwą rodzajową *Agriotherium* Wagn., to występowanie *A. insigne* (Gerv.) we Francji, *A. intermedium* w Polsce i *A. sivalense* (Falc. & Cautl.) w północnych Indiach (Siwalik) wskazuje na istnienie w pewnym okresie czasu nici wiążącej formy bardzo do siebie zbliżone na długim szlaku od Francji do Indii.

Określenie czasu występowania grupy *Hyaenarctos* napotyka na pewne trudności, nie zawsze bowiem zgodnie ustalany jest przez geologów wiek złóż, w których

znajdowano szczątki przedstawicieli tej grupy i waha się on w granicach od górnego miocenu do górnego pliocenu. Złoża, w których znaleziono szczątki *Agriotherium* Wagn., datowane są z pliocenu; środkowy lub górny pliocen zdaje się być okresem największego rozwoju gatunków tego rodzaju. Natomiast szczątki *Indarctos* Pilgr. spotykane są częściej w dolnym, aniżeli w środkowym pliocenie, i *Indarctos* uważany jest (G. E. Pilgrim, 1931; H. Tobien, 1952 i in.) za charakterystyczny element fauny hipparionowej w południowej Europie i Azji.

Ponieważ drapieżne, poznane dotychczas dokładniej z brekcji kostnej Węży, zbliżają się do elementów wymarłej fauny, znanych ze złóż Montpellier we Francji, a czas powstania tych złóż przesuwany jest z dolnego do środkowego pliocenu, przeto i szczątki *Agriotherium intermedium* należałoby datować jako pochodzące ze środkowego pliocenu.

Jakkolwiek gatunki rodzaju *Agriotherium* Wagn. morfologicznie zbliżają się bardzo do gatunków rodzaju *Indarctos* Pilgr. i prawdopodobnie miały wspólnego przodka, a także niemal ten sam czas swego powstania i wygaśnięcia, to jednak ich rodowe linie biegną oddzielnie. Przodka ich szukać należy w miocenie i kryje się on wśród rzeszy drobnych form rodzaju *Ursavus* Schloss. Pomijając różnice wielkości, zęby trzonowe *Ursavus* Schloss. są tak zbliżone kształtem do tychże u *Indarctos* Pilgr., że niektóre gatunki rodzaju *Ursavus* były początkowo oznaczane jako należące do rodzaju *Hyaenarctos* (Falc. & Cautl.), np. *Ursavus brevirhinus* Hofmann, 1887, opisany przez M. Schlossera w 1887 r. jako *Hyaenarctos minutus* Schloss., a *Ursavus depéreti* Schlosser, 1902, opisany przez Ch. Depéreta w 1895 r. jako *Hyaenarctos arctoidens* Dep.

Osobniki rodzaju *Agriotherium* dosięgały znacznych rozmiarów ciała, gdyż czaszka *A. sivalense* (Falc. & Cautl.) miała, według R. Lydekkera (1884) 482,6 mm długości, czyli zwierzę wielkością zbliżało się do bardzo dużych okazów niedźwiedzia jaskiniowego. Niewiele mniejszą musiała być czaszka *A. intermedium*, gdyż — biorąc pod uwagę stosunek długości zębów M^1 i M^2 w górnej szczęce u *A. sivalense* do długości czaszki tego gatunku (57 mm : 482,6 mm) — przy długości tych zębów u *A. intermedium*, która wynosi 51 mm, długość czaszki tego gatunku wynosiłaby 431,4 mm.

Silnie rozwinięte zęby tnące u wszystkich gatunków grupy *Hyaenarctos* wskazują, że przedstawiciele tej grupy były drapieżnikami o potężnych rozmiarach ciała. Duży ząb przedtrzonowy czwarty górnej szczęki, podobny kształtem do tegoż zęba u hieny, ułatwiał zapewne zwierzęciu kruszenie nawet dużych kości. Sposób życia *A. intermedium* mógł więc być podobny do życia hien. Mogły to być zwierzęta stepów, z występującymi gdzieniegdzie skupieniami drzew i krzewów, szczególnie w pobliżu zbiorników wody, które z całą pewnością musiały występować w pewnym okresie czasu w okolicy Węży.

OBJAŚNIENIA DO ILUSTRACJI

Pl. I

Fig. 1. Fragment prawej strony górnej szczęki z resztką przedtrzonowego czwartego i zębami trzonowymi pierwszym i drugim.

Fig. 2. Siekacz trzeci z lewej strony górnej szczęki.

Fig. 3. Fragment dolnej szczęki z lewej strony z resztką czwartego zęba przedtrzonowego.

Fig. 4. Pierwszy trzonowy z lewej strony dolnej szczęki, widziany od strony dojęzykowej.

Fig. 5. Pierwszy ząb trzonowy z prawej strony dolnej szczęki: *a* od strony zewnętrznej, *b* od strony dojęzykowej.

Wszystkie okazy wielkości naturalnej

Pl. II

Fig. 1. Szereg zębów górnej szczęki P^4 - M^2 *Agriotherium insigne* (Gerv.), wg Ch. Fricka (1926—30); nieco zmniejszone.

Fig. 2. Szereg zębów górnej szczęki P^4 - M^2 *A. sivalense* (Falc. & Cautl.), wg Ch. Fricka (*l. c.*); nieco zmniejszone.

Fig. 3. Szereg zębów górnej szczęki P^4 - M^2 *A. palaeindicum* Lyd., wg Ch. Fricka (*l. c.*); nieco zmniejszone.

Fig. 4. Drugi ząb trzonowy górnej szczęki M^2 *Agriotherium* sp. wg H. Helbinga (1932); wielk. nat.

Fig. 5. Pierwszy ząb trzonowy dolnej szczęki M_1 *Indarctos* sp. z Samos, wg H. Helbinga (*l. c.*); wielk. nat.

Fig. 6. Ten sam ząb, widziany z góry, wg H. Helbinga (*l. c.*); wielk. nat.

Fig. 7. Pierwszy ząb trzonowy dolnej szczęki M_1 *A. insigne* (Gerv.) z Montpellier, widziany z góry, wg J. Vireta (1939); wielk. nat.

ЯН СТАХ

AGRIOTHERIUM INTERMEDIUM N. SP. ИЗ ПЛИОЦЕНОВОЙ КОСТНОЙ БРЕКЧИИ ИЗВЛЕЧЕННОЙ В МЕСТНОСТИ ВЕНЖЕ В ПОЛЬШЕ

Резюме

Автор описывает фрагменты зубов *Agriotherium* Wagn. (= *Hyaenarctos* Falc. & Cautl.), извлеченных из плиоценовой костной брекчии в местности Венже Польше и определяет их принадлежность к новому виду *Agriotherium intermedium*, который занимает в строении короны коренных зубов, в особенности M^2, как бы промежуточную систематическую позицию между *A. insigne* (Gerv.) из Монпелье (Montpellier) во Франции и *A. sivalense* (Falc. & Cautl.) из Сивалика (Siwalik) в Индии.

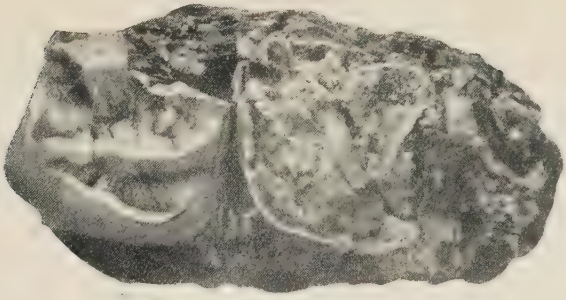
Agriotherium intermedium был составной частью фауны близкой фауне из Монпелье и его геологический возраст был также вероятно средне-плиоценовый. Образ жизни *A. intermedium* был вероятно близок образу жизни гиен, подобно ископаемым представителям этой группы.

Pl. I

Fig. 1. Fragment of the right maxilla with damaged P^4, M^1 and M^2.
Fig. 2. I^3 of the left maxilla.
Fig. 3. Fragment of the left mandible with P_4 strongly damaged.
Fig. 4. M_1 of the left mandible, lingual view.
Fig. 5. M_1 of the right mandible; *a* labial view, *b* lingual view.
All figures of natural size

Pl. II

Fig. 1. P^1-M^2 of *Agriotherium insigne* (Gerv.). after Ch. Frick (1926—30); somewhat reduced.
Fig. 2. P^4-M^2 of *A. sivalense* (Falc. & Cautl.), after Ch. Frick (*l. c.*); somewhat reduced.
Fig. 3. P^4-M^2 of *A. palaeindicum* Lyd., after Ch. Frick (*l. c.*); somewhat reduced.
Fig. 4. M^2 of the right maxilla of *Agriotherium* sp., after H. Helbing (1932); nat. size.
Fig. 5. M_1 of the mandible of *Indarctos* sp. from Samos, after H. Helbing (*l. c.*); nat. size.
Fig. 6. The same tooth, top view, after H. Helbing (*l. c.*); nat size.
Fig. 7. M_1 of mandible of *A. insigne* (Gerv.) from Montpellier, top view, after J. Viret (1939); nat. size.



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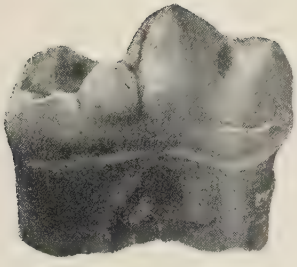

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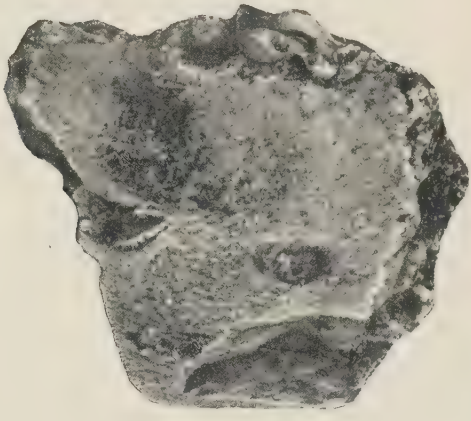

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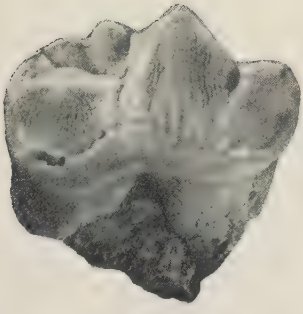

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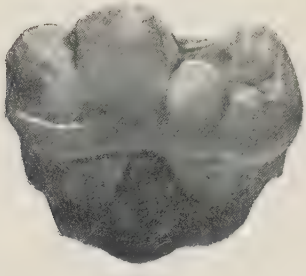

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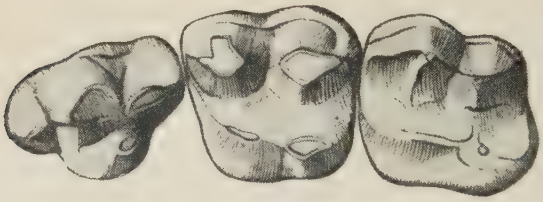

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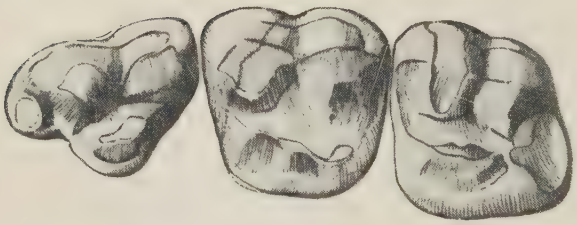

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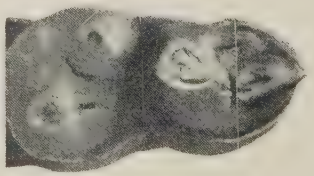

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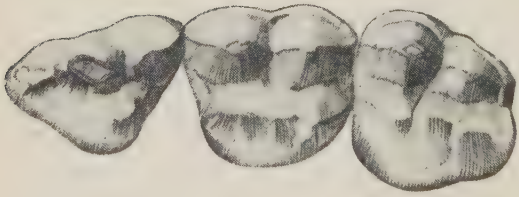

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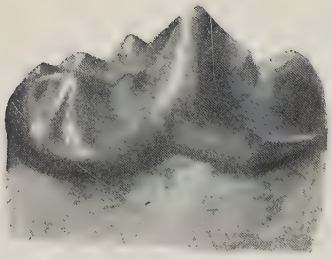

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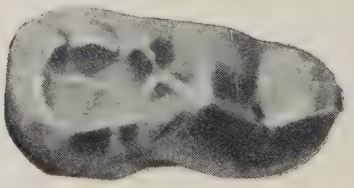

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GERTRUDA BIERNAT

ON *PEREGRINELLA MULTICARINATA* (LAMARCK) (BRACHIOPODA)

Abstract. — Numerous specimens of *Peregrinella multicarinata* (Lamarck) have been studied on Polish and French material, with consideration to the ontogeny and individual variability of this form. The Polish material was collected from the vicinity of Wieliczka and abounds in young individuals, that from France was lent to the author from the collection of the Palaeontological Museum of the Humboldt University in Berlin.

INTRODUCTION

The writer was incited to start work on this paper by a number of specimens of *Peregrinella multicarinata* (Lamarck), a well known brachiopod, which were collected in the years 1936-38 by Dr. J. Burtan from the „Grodziszcze (Grödischter) beds" of the Carpathian Mountains, at the locality of Raciborsko (Wieliczka sheet). The material in question was turned over by the finder to Prof. R. Kozłowski who, in turn, entrusted the writer with the task of working it out.

The presence in the material of fairly numerous juvenile specimens has made it possible to discuss the problem of variations connected with ontogenic development, which has not thus far been studied.

In 1955, during her visit to Berlin, the writer when going through the collection of the Palaeontological Museum at the Humboldt University, came across quite numerous specimens of *Peregrinella* from France. These were kindly lent to her. During the visit to Berlin in 1956 the opportunity offered itself to study at large the most important papers on *Peregrinella*, not available in Poland. Such favourable circumstances led to an all-round study of this interesting brachiopod. It resulted in the present paper, prepared at the Palaeozoological Laboratory of the Polish Academy of Sciences in Warsaw, under the guidance of Prof. Dr. R. Kozłowski to whom the most sincere thanks are due for his suggestions and helpful criticism. To Dr. J. Burtan the writer is grateful for lending her collection of *Peregrinella*. She also wishes to convey warm words of thanks to Professor Dr. W. Gross, Head of the Institute of Palaeontology at the Humboldt University in Berlin, for the hospitality extended at that

Institute and for the loan of comparative material from the Palaeontological Museum. Photographs accompanying the paper were taken by Miss M. Czarnocka to whom words of thanks are also due.

MATERIAL

The material from Poland available to the writer in the course of studies on *Peregrinella multicarinata* (Lamarck) was relatively ample. It consisted of 33 almost complete specimens of juvenile individuals, also of 3 mature, one of which is nearly perfect. In addition, there were numerous fragmentary shells of various size. The shells were partly recrystallised, and have lost their fibrous texture, so characteristic of brachiopods. All the specimens have been prepared from limestone encountered in detached angular blocks, about 20 cm in diameter, at the village of Raciborsko (Wieliczka sheet), 6 km to the south of Wieliczka.

Besides brachiopods the rock yielded calcified sponge spicules. The limestone shows lack of glauconite and the presence of pyrite, suggesting badly aerated environment of sedimentation of the deposits which yielded *Peregrinella*. The fragmentary preservation of the shells of large individuals indicates disturbed conditions of the sedimentation process. It had probably taken place at some distance from the sea shore, as is suggested by the extreme scarcity of terrigeneous material.

The weathered rock has to some extent facilitated the recovery of specimens forming assemblages of individuals of different size lying in most varied positions. The state of preservation of the majority of specimens is quite satisfactory. Most of them have suffered some damage in their umbonal region during the recovery from the rather hard rock matrix. This proved unavoidable in spite of the utmost care exercised.

The material derived from France, available to the writer, consisted of 37 prepared specimens, mostly representing adolescent or mature individuals. It included one of L. Buch's original specimens (syntype). All the specimens were recovered from Lower Cretaceous limestones in south-western France, mostly in the vicinity of Châtillon, dept. Drôme. All the French specimens are satisfactorily preserved, being only slightly damaged in their umbonal region. This, however, has been an obstacle to the closer investigation of the delthyrial plates and the foramen.

Thin microscopic sections, cut from *Peregrinella* limestone from France, show the presence of numerous, fine-grained calcite centres. The organic remains are very sparse.

When studying the external morphology of the shells no great difficulties were encountered owing to the satisfactory state of preservation. Specimens with slightly damaged umbonal region showed partly pre-

served planarea, sometimes also part of delthyrial plates. The triangular delthyrium was as a rule poorly marked and the pedicle-opening not readily recognisable.

In what the internal structure is concerned, its investigation was possible by the method of serial grinding only. The inside of the shell was empty in many specimens and the shell walls incrusted with calcite crystals. Yet, such elements of internal structure as teeth, the cardinal plate, crura and the dorsal septum, were preserved and well discernible in the serial sections.

HISTORY OF RESEARCHES ON *PEREGRINELLA MULTICARINATA* (LAMARCK)

The interest aroused by this brachiopod dates back to 1819 when Lamarck in his „Histoire naturelle des animaux sans vertèbres" gave a short account of this form. He referred it to the Terebratulae with longitudinal striation. His Latin diagnosis reads: „T. testâ magnâ, rotundatâ, pectiniformi, costis numerosis carinatis, margine non sinuato", while the short French description is as follows: „Grande et belle espèce qui a la forme d'un peigne. Ses côtes sont très nombreuses, rayonnantes et l'angle qui forme leur carène est assez aigu. Longueur 75 mm, largeur 80 mm". Lamarck gave his form the name of *Terebratula multicarinata,* without, unfortunately, accompanying it by any figures.

Independently of Lamarck, L. v. Buch described the same form from Cretaceous limestone deposits at Châtillon in France, in his paper „Über Terebrateln" published in 1835. He established for it a new species under the name of *Terebratula peregrina* Buch. The name assigned by Buch was subsequently accepted in literature, in spite of Lamarck's uncontestable right to priority. Most probably, Buch was not, at that time, acquainted with Lamarck's paper written in 1819, while the specific name of *„peregrina"* has already in 1813 been applied by J. F. Schlotheim to *Terebratulites peregrinus,* another Jurassic brachiopod. The latter species (*fide* F. Toula, 1911), is mentioned as early as in 1717, in J. J. Scheuchzer's work „Naturgeschichte des Schweizerlandes" as *Terebratula gregaria* (biplicate), recorded from Kössener Schichten. It might be here mentioned that H. G. Bronn in his „Index palaeontologicus" of 1848 figures two such widely distant forms as *Terebratula peregrina* Buch and *T. gregaria* Scheuchzer under one specific name of *Terebratulites peregrinus.*

Buch, when describing *Terebratula peregrina,* was not certain about the systematic position of this species. Tentatively he referred it to the group of Terebratulae „plicatae" in which the surface of both valves is plicated, and to the sub-group of „alatae", stressing that this form differs from other recorded Terebratulae. He also suggested that it might be an

Orthis („peut-être est-ce une *Orthis*"). According to Buch's diagnosis *Terebratula peregrina* appears to be an unusually large form, as long as wide, attaining 100 mm, and with thickness up to 45 mm. The outline of the shell is sub-circular. On Buch's description and figures this is certainly a species identical with *T. multicarinata* Lamarck.

In 1847 A. d'Orbigny in his „Paléontologie Française" (p. 16, pl. 496) describes and figures the same species from Neocomian deposits in the vicinity of Châtillon. He refers it to the Rhynchonellacea, then already established, and records it as *Rhynchonella peregrina* Buch. According to d'Orbigny this is perhaps one of the forms with most regular outline, in which the length is equal to the breadth, both attaining or even exceeding 80 mm, while the thickness may be up to 50 mm. One must suppose that d'Orbigny was acquainted with Lamarck's paper, he does not, however, make any mention of it and recognises Buch's species.

In 1850, T. Davidson made a revision of the Terebratulae specified by Lamarck whose paper on that subject was not so very lucid. Namely, he did not publish any information as to the site and deposits from which the fossil remains described by him had been recorded. His data were restricted to short and precise Latin definitions of species, frequently without any figures. Davidson revised Lamarck's original specimens which had been deposited partly at the Jardin des Plantes in Paris, partly in Benjamin Delessert's Museum where Lamarck's private collections were kept. In the course of this revision, T. Davidson sometimes met considerable difficulties in identifying Lamarck's original types. There was no trouble, however, in regard to the identification of *Terebratula multicarinata*. Although Lamarck's diagnosis for this species is very short, yet the appearance of this brachiopod is so characteristic that it provides full certainty as to its identity. Davidson was of the opinion that there can be no doubts as to the priority of the name given by Lamarck, which was not always recognised in papers of later authors. In his considerations, Davidson stresses, as also did earlier authors, that *T. multicarinata* Lamarck recorded from Neocomian deposits in the vicinity of Châtillon, is the largest of all the known Terebratulae. He publishes a drawing of the specimen described by Lamarck (1850, pl. 14, fig. 37, reproduced in the present paper — fig. 1). This specimen is not large, but the author points out that individuals of this species attain considerably greater dimensions.

In 1872 F. A. Quenstedt (p. 154, pl. 40, fig. 96-100) described and figured a specimen of *Terebratula peregrina* Buch from Die, dept. Drôme in France. He stressed that this form had been made popularly known by Buch and that d'Orbigny had assigned it to the Neocomian but that it had been recorded in Lamarck's paper under the specific name of *multicarinata*. The specimen figured by Quenstedt belongs, according to this author,

to an elongate variety of moderate length („...gehört zu den mittelgrossen länglichen Varietäten", pl. 40, fig. 96). He also points out that this form is an unusual, noteworthy fossil, and that it merits the creation of at least a sub-genus.

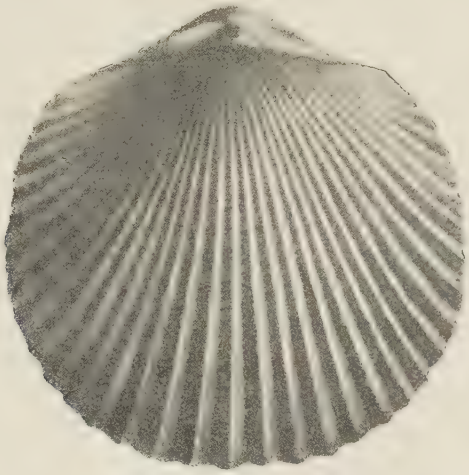

Fig. 1. — *Terebratula multicarinata* as described by J. B. Lamarck (1819) and figured by T. Davidson in 1850; reduced size. (Nat. size of the original is 7.62 cm in length and width, 4.44 cm in thickness).

Upon comparing the figures of Buch with those of d'Orbigny, Davidson and Quenstedt there is not the least doubt that they all had described the same species, all the more so since every one of the specimens mentioned by them was recorded from the same zone and localities.

In 1887, a new genus, *Peregrinella*, is established for *Terebratula peregrina* by D. P. Oehlert in P. Fischer's work „Manuel de conchyliologie", p. 1305). The specific name of *peregrina* is, however, wrongly stated there as being established by d'Orbigny instead of by Buch.

In 1911, in a paper on the Transsylvanian *Peregrinella* from the vicinity of Kronstadt (Brasov) in Rumania, F. Toula refers to that form under Lamarck's specific name of *multicarinata*.

In 1913, W. Kilian also recognises Lamarck's species, figuring a form from Rottier, dept. Drôme, under the name of *Peregrinella multicarinata* Lamarck. He observes close resemblance between this species and the Batonian genus *Eudesia*. On the other hand, it is suggested in the same paper by Ch. Jacob that the position of the pedicle-opening in *Peregrinella*, by him believed to be apical, brings this form near to the family of Magellanidae and not to that of Rhynchonellidae, as maintained by d'Orbigny. Regretfully, it is difficult to determine the position of the

pedicle-opening in *Peregrinella* owing to the very unsatisfactory state of preservation of the umbonal regions. It is not sure if the figure by Davidson (our fig. 1) is not idealised on this point.

Observations made by the present writer lead her to infer that the position of the pedicle-opening is that usual in Rhynchonellacea, i. e. under the apex. In addition, both the nonporous texture of shell and the internal morphology indicate that *Peregrinella* belongs to the Rhynchonellacea.

In 1924, V. Renngarten when describing a *Peregrinella* from the Caucasus uses the name of *multicarinata,* thereby recognising the priority of Lamarck's designation.

Nevertheless, as late as in 1952, the name of *peregrina* Buch was incorrectly used for this species in a paper by J. Roger published in „Traité de Paléontologie" under the editorialship of J. Piveteau (v. II, pl. 4).

To conclude, the correctness of Davidson's view may be pointed out in that he was the first to restore the priority of Lamarck's specific name by revising *Terebratula multicarinata.* Thus, the name of *peregrina* introduced by Buch must be dismissed as synonymous with *multicarinata* Lamarck.

STRATIGRAPHIC CONDITIONS OF THE OCCURRENCE OF GENUS *PEREGRINELLA*

It is from some localities in the department Drôme of south-western France that have been recorded the typical specimens of *Peregrinella,* described and figured by Lamarck, Buch, d'Orbigny and Quenstedt. Beautifully preserved shells of this brachiopod have also been discovered at a number of other places in France, in the departments of Hérault and Gard.

Limestones yielding *Peregrinella* frequently occur as large detached blocks occasionally displaying strong calcification and silification. Within such blocks *Peregrinella* has been observed in crowded assemblages of individuals of various age, mainly associated with ammonites. The latter, after W. Kilian (1931), belong to genera *Phylloceras, Holcodiscus* and *Crioceras.*

This brachiopod — a most interesting one as regards both, its outer appearance and sporadical occurrence — has for a long time attracted the attention of many writers who were interested by its systematic and stratigraphic position and its geographical distribution. Observations thus far have shown *Peregrinella* to occur within Upper Hauterivian deposits. The age, however, of the original specimens collected by Lamarck and Buch was not definitely fixed for quite a long time and presented an open question subject to much discussion. It was a problem somewhat difficult

to clarify inasmuch as quite often numerous, very satisfactorily preserved specimens were recovered not in situ but from detached limestone blocks. Many authors, in fact, regarded *Peregrinella* limestones either as younger or as older than the Hauterivian. New light, however, was continuously shed on the problem as fresh finds of this form were recorded.

In 1853, M. de Rouville (*fide* Renngarten, 1924) refers the *Peregrinella* beds from France to the Neocomian, without, however, assigning it to a precisely determined horizon. In 1868, H. M. Coquand questions their Neocomian age, being inclined to refer them to the Upper Jurassic. E. Hébert (1871) has observed beds crowded with *Peregrinella* in association with ammonites which are in a distinct minority. He believes these beds intermediate between the uppermost Oxfordian and the Lower Neocomian. L. Dieulafait (1871) recorded this form from beds which he referred to the Barremian, at the localities of Rottier, Gigondas and Saint-Trois-Château. Some time after, in the year 1897, F. Roman and M. de Rouville collected it in situ from limestone containing *Serpula recta* Goldfuss, in the vicinity of Montpellier, dept. Hérault. They referred these beds to the Upper Valanginian, without, however, denying the possibility of referring them to the Hauterivian. These authors stress the difficulty in determining the age of beds here considered. In connection therewith they write as follows: „L'âge géologique des couches à *Serpula recta* et *Rhynchonella peregrina* extrêmement difficile à préciser, cependant on peut affirmer par comparaison avec la coupe Castelnau à Clapier et par la nature pétrographique de ses assises, qu'elles appartiennent à un niveau extrêmement élevé du Valanginien, peut-être même à la base de l'Hauterivien".

Finally, detailed geological and stratigraphical studies in southwestern France have led V. Paquier in 1900 (*fide* Renngarten, 1924) to refer limestone blocks with *Peregrinella* to the Hauterivian, equivalent to the *Hoplites angulicostatus* d'Orb. zone and consequently younger than had thereto been believed by previous writers. In such way the contestible age of *Peregrinella* limestones seems to be definitely settled.

The determination of the stratigraphical position of the *Peregrinella* beds from France facilitated the establishment of the age — sometimes also discussed — of beds outside of France, yielding shells of *Peregrinella*.

For example, L. Hohenegger (1861) who investigated North Carpathian areas of Silesia and those bordering Moravia and southern Poland, has recorded *Peregrinella* from the Grodziszcze sandstone (Grödischter Sandstein), then referred to Upper Cieszyn (Teschener) beds. At the time it was difficult to determine the age of the sandstone. The beds from which Hohenegger has recovered *Rhynchonella peregrina* in association with a belemnite and ammonite fauna, constitute a far stretching horizon

within Lower Cretaceous deposits of the Beskidy Range, now referred to the Middle Neocomian. Fossils recovered from sandstone beds consisting of coarse-clastic terrigeneous material, which are the only formation of the kind within Neocomian beds of the Alpino-Carpathian region, were sometimes very fragmentary. This made difficult their identificaton, as stressed by E. Ascher (1906) who has described the fauna from the Grodziszcze (Grödischer) beds, collected and only identified by Hohenegger. In the opinion of the former writer, *Rhynchonella peregrina*, a characteristic form for the Neocomian, is the most diagnostic in matters of stratigraphy, out of all that fauna consisting of gastropods, brachiopods and cephalopods.

As early as in 1901, in a paper on the cephalopod fauna from Cieszyn (Teschener) and Grodziszcze (Grödischter) beds, V. Uhlig mentions *Rhynchonella peregrina* to have been collected there. On this important evidence that author referred the Grodziszcze beds to Middle Neocomian.

In Italy, C. Viola and M. Cassetti (1893) have proved the occurrence of Neocomian beds in Monte Gargano on the presence there of limestones with *Peregrinella*. W. Deecke (1895, p. 485) and E. Haug (1920, p. 1205), as well as others, make mention of this quoting the above named writers.

In 1903, M. Remeš cites *Rhynchonella peregrina* as recorded from Moravia where it had already before been identified by Hohenegger (1861). Remeš collected this form not in situ but from a detached limestone block found in yellow argillaceous soil at a depth of 0.5-0.75 m. The block contained abundant specimens of *Peregrinella* which that author was led to regard as the true „*peregrina*" on comparing it with French specimens in the paleontological collections, at the Vienna University. Finds of this kind were not rare in Moravia.

F. Toula (1911) gives a fairly detailed description of *Peregrinella* from Transsylvania in Rumania. He does not, however, mention the exact age of the limestones from which it was recovered. In later years, G. Macovei (1927, 1934) and N. Oncescu (1943) cited *Peregrinella peregrina* (Buch) from Sinaia Hauterivian beds; L. Bancila (1941) stresses that *P. peregrina* (Buch) collected by F. Herbich (1878) adequately establishes the Valanginian-Hauterivian age of beds which yielded that form.

V. Renngarten (1924) described *Peregrinella* from the western part of Kuban in North Caucasus. The stratigraphy of Kuban limestone beds has been the object of much research work. S. Czarnocki in 1914 (fide Renngarten, 1924) referred them to the Valanginian, without, however, adequate palaeontological argumentation. Renngarten (1924) is of the opinion that they ought rather to be assigned to the Upper Hauterivian as is suggested by the stratigraphical position of *Peregrinella* in Western Europe.

Recently, the presence of a brachiopod most probably referable to *Peregrinella*, has been recorded in Lower Cretaceous beds from Germany, in the district of Werle in Mecklenburg [1].

Outside of Europe, *Peregrinella* occurs in Lower Cretaceous deposits of California in USA. The American form was originally described by W. M. Gabb (1869) under the name of *Terebratella whitneyi*. Deposits yielding this species were at first regarded by him as of Miocene age. Subsequently, however, on evidence supplied by minute investigation of rocks containing *T. whitneyi* he published some supplementary notes in the end part of his paper in which he recognises this form as a true *Rhynchonella*, very closely resembling *Rh. peregrina* from the French Neocomian. He also stresses the undoubtedly near relationship of these two species. W. M. Gabb thus recognises the age of the respective beds as being Lower Cretaceous and assigns them to the Valanginian. His view in this matter was confirmed by the discovery, in addition to *Rh. whitneyi*, of other Lower Cretaceous fossils, such as *Aucella* sp. and some belemnites. In later American literature (J. W. Stanton, F. M. Anderson, L. G. Hertlein & U. S. Grant and others) mention is made of the occurrence in California of *Peregrinella whitneyi*. These authors do not doubt the similarity of *P. whitneyi* to *P. multicarinata* and recognise the age of beds yielding this form as Lower Cretaceous.

In Poland, *Peregrinella* has been discovered in Raciborsko (Wieliczka sheet), as mentioned above.

A brief report follows here on the stratigraphical conditions in which this species was found in this area, based on informations kindly supplied to the writer by Dr. J. Burtan.

Three tectonic units may be differentiated within the Raciborsko area in a north to south direction. They are: 1) the Miocene foreland, 2) the sub-Silesian Unit, 3) the Silesian Unit.

The occurrence of *Peregrinella* is associated with the top part of the Grodziszcze (Grödischter) beds in the Silesian Unit.

The following stratigraphical horizons have been distinguished in this Unit (in descending order):

1) Krosno beds, made up of menilitic shales, hieroglyph layers with variegated shales, and Ciężkowice sandstones with variegated shales at bottom;

2) Istebna beds, differentiated into upper and lower Istebna sandstones;

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[1] Data taken from a manuscript by G. M. Chryploff of the Staatliche Geologische Kommission in East Berlin.

3) Godula beds, with a development of mainly variegated shales containing a thin radiolarite layer;

4) Lgota beds, whose top part displays a characteristic gaize facies, developed as sandstones and hornfelses, while black argillaceous shales constitute the bottom part;

5) Wierzowice beds, developed as argillaceous-marly shales, black coloured, with inclusions of fine and moderately bedded sandstones;

6) Grodziszcze-Cieszyn beds (Grödischter-Teschener Schichten), showing some facial differentiation, namely: a) Cieszyn upper shales facies, b) a facies of calcareous sandstones containing pink quartz and alternating with marly shales, black or ash coloured, c) ash coloured marly shales facies.

The Grodziszcze beds occupy a relatively large area within this differentiated facial development and they may be traced both to the east, to the west and also, as long streaks or patches, to the north.

The specimens of *Peregrinella* described in the present paper has been found in the outcrops of the upper Grodziszcze beds where marly shales occur, coloured dark-ash or black, with fine bedded calcareous sandstones and with occasional calcite veins and lenses of calcareous coarse-grained sandstones. A similar stratigraphic position is occupied by *Peregrinella* in other parts of the Western and Eastern Carpathians.

Specimens of this brachiopod, of different size, have been collected from calcareous sandstone with re-crystallized matrix, showing centres of dark coloured arenaceous marls containing sparsely dispersed quartz grains. This type of sandstones is characteristic of the Grodziszcze beds within the Western Carpathians.

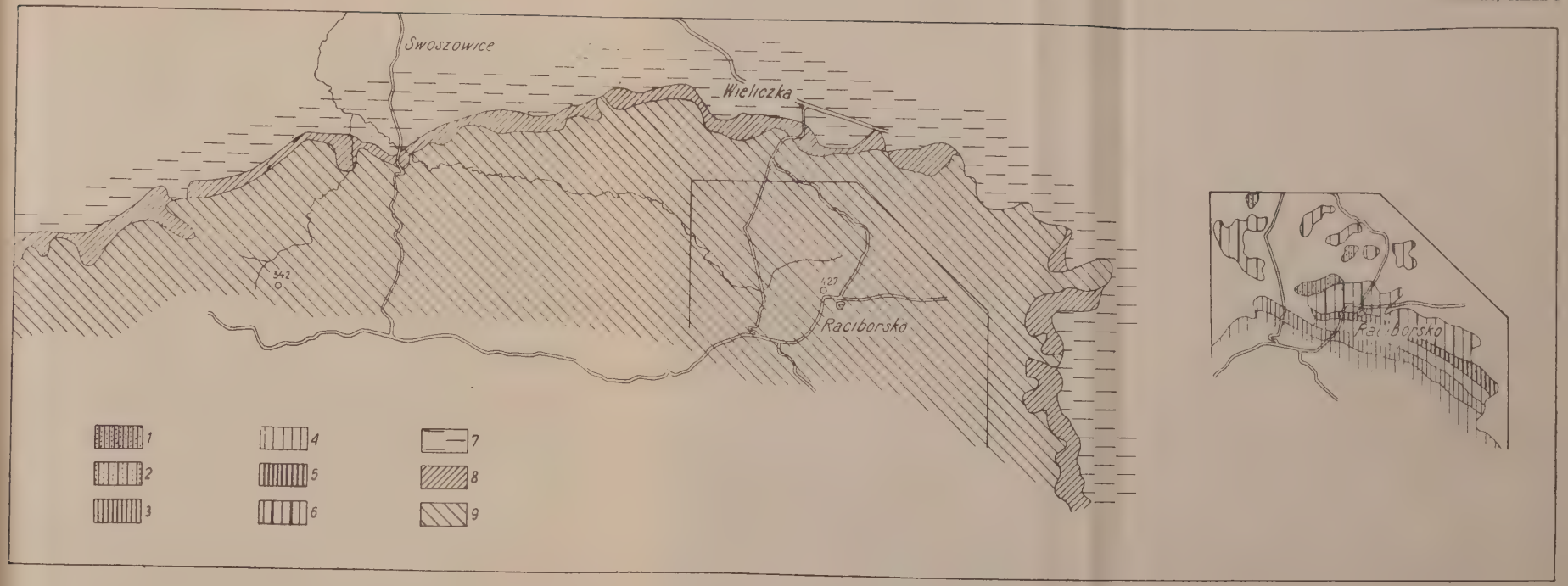
No new finds of this brachiopod have thus far been recorded in Poland, hence the Raciborsko *Peregrinella* provides a link in this respect between the Carpathians of Silesia and Moravia and those of Rumania where it has already been described. At the same time it is to be noted that the site of the *Peregrinella* occurrence in Poland marks the most northerly point of its range within the Carpathians.

DESCRIPTION

Peregrinella multicarinata (Lamarck)

(pl. I-VIII)

1819. *Terebratula multicarinata* Lamarck; J. B. Lamarck, Histoire..., p. 253, 3 éd 1839, III, p. 126.
1835. *Terebratula peregrina* Buch; L. v. Buch, Über Terebrateln, p. 73-74.
1838. *Terebratula peregrina* Buch; L. v. Buch, Essai..., p. 156, pl. 15, fig. 28.
1847. *Rhynchonella peregrina* Buch; A. d'Orbigny, Paléontologie..., p. 16, pl. 493.
1850. *Terebratula multicarinata* Lamarck; T. Davidson, Note..., p. 441, pl. 14, fig. 37



GEOLOGICAL SKETCH OF AREA S OF WIELICZKA 1 : 100.000
(by Dr. J. Burtan)

Legend: 1 Krosno beds, *2* Istebna beds, *3* Godula beds, *4* Lgota beds, *5* Wierzowice beds, *6* Grodziszcze beds; *7* Miocene foreland, *8* sub-Silesian Unit, *9* Silesian Unit

1872. *Terebratula peregrina* Buch; F. A. Quenstedt, Petrefacten..., p. 154, pl. 40, fig. 96-100.
1887. *Peregrinella peregrina* d'Orbigny; D. P. Oehlert, Brachiopodes..., p. 1305.
1903. *Peregrinella peregrina* Buch; M. Remeš, Rhynchonella..., p. 223.
1906. *Rhynchonella peregrina* Buch; E. Ascher, Gastropoden..., p. 135, pl. 14, fig. 11 a-d
1910. *Peregrinella multicarinata* Lamarck; W. Kilian, Handbuch..., p. 205, pl. 4, fig. 4.
1911. *Peregrinella multicarinata* Lamarck; F. Toula, Über Rhynchonella..., p. 27, pl. 3, fig. 2-7.
1924. *Peregrinella multicarinata* Lamarck; V. Renngarten, Sur les Pérégrinelles..., p. 119-127, pl. 2, fig. 1 a-b.
1944. *Peregrinella multicarinata* Lamarck; L. G. Hertlein & U. S. Grant, The cenozoic Brachiopods ..., p. 65.

Thus far, the research work concerning *Peregrinella* has been, on the whole, somewhat superficial and limited to the external morphology of adult individuals. The general contour of the shell, its dimensions and, most particularly, its ornamentation are the external features that have been more closely studied. Another character considered as noteworthy is the rather extensive individual variability, most easily observable in the dimensions of the shell, its thickness, and the number and thickness of radial folds (Toula, 1911; Renngarten, 1924).

Questions concerning the internal morphology has not, thus far, been much studied, the respective information being consequently very inadequate. Such external elements as ventral teeth, dorsal septum, and crura have been mentioned and partly figured, in a few papers only among others in those by Quenstedt (1872) and Toula (1911).

The internal and external morphology of *Peregrinella* have been studied by the present writer on specimens from Poland and France. It should be stressed that the internal morphology of all the studied specimens is uniform and that differences in the external appearance of Polish and French specimens are insignificant.

The entire Polish material available to the writer consisted of 33 adolescent individuals, mostly satisfactorily preserved, the beak portions excepted, four adult individuals of which one almost perfect, the other three with their beak- and antero-lateral portions badly damaged; some shell fragments and finally a few ventral and dorsal valve impressions.

In the next chapter follows a description of the external morphology of the most satisfactorily preserved Polish specimen, also of the internal morphology based on serial grinding of other specimens.

External morphology. Dimensions (in mm): length 59.3, width 58.8, thickness 38.4 (pl. II, fig. 1 a-c).

Shell of medium size, biconvex; general outline sub-circular with rounded antero-lateral margins; maximum thickness below the hinge-line toward the middle of the shell; greatest width at about midlength; hinge-

line long, approximately 41 mm, but a little shorter than greatest shell width; its central part gently curves upward, while the lateral parts descend somewhat obliquely to the cardinal extremities; these are rounded, as also are the lateral and anterior margins.

Ventral valve rather strongly and regularly arched along midline from beak to front; umbo greatly elevated, relatively large, beak incurved; planarea low, about 2.5 mm in height, long, somewhat shorter than the hinge-line, moderately curved, only partly discernible under the bent beak, delimited from the ventral valve by distinct, sharp beak ridges.

Dorsal valve, alike to the ventral one, uniformly convex along its whole length; beak hidden by that of opposite valve.

Ornamentation most regular, marked by about 35 distinct, high and thick radial folds, showing sharp ridges and furrows. The number of folds in each valve is almost the same; the commissure joining the two valves is strongly zigzag (pl. IV, fig. 2 c). The folds begin at about 2 mm from the apex, as fine but distinct striae widening out and growing higher anteriorly. As the shell grows, secondary additions of folds take place in postero-lateral areas, usually only one on each side. The slopes are without radial ornamentation; they are covered by concentric growth lines only. not always readily recognizable in parts with radial ornamentation.

Internal morphology very simple, as is shown by serial grinding of Polish and French specimens. As compared to the size and thickness of valves, it shows relatively poor development of structural features.

Ventral valve: teeth not large, with uneven surface, somewhat longer than broad (fig. 2); dental plates slightly developed; muscle scars not discernible.

Dorsal valve: hinge plates (fig. 2) narrow and long; crural processes pass into narrow crura, running almost parallel to one another, with a barely 2 mm spacing. They are long, usually extending up to nearly midlength of the valve, and run along both sides of the dorsal septum, slightly diverging to the outside anteriorly (fig. 3 c); hinge-sockets shallow and rounded; dorsal septum extremely narrow and long, stretching beyond the midlength of the valve; muscle scars are not marked.

Ontogeny (pl. I, fig. 1-6; pl. III, fig. 1-4; text-pl. I, fig. 1-16). The material on which the ontogeny was studied, though not perfectly complete, was sufficiently numerous to illustrate the chief changes in morphology occurring during the growth of the shell. The particular stages of ontogeny were each represented by several specimens.

The earliest, nepionic, stage, characterized by smooth surface in both valves (without radial ornamentation), was recognizable in the posterior parts of the larger specimens only.

Peregrinella multicarinata (Lamarck)

Fig. 1-16. Sixteen young Polish specimens in various growth stages: *a* dorsal view, *b* ventral view, *c* lateral view. *Note* variability in exterior outline of shell, in length of hinge-line and in thickness of shell; × 3.3.

Dimensions of the smallest available specimen (figured in text-pl. I, fig. 1 a-c) are as follows: length 3.8 mm, width 3 mm, thickness 1 mm. Specimen longer than wide, with a distinctly pentagonal outline

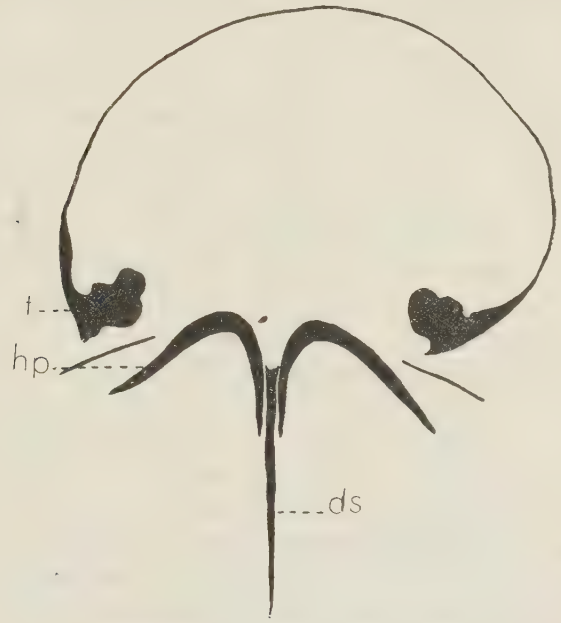


Fig. 2. — *Peregrinella multicarinata* (Lamarck); transverse section of the hinge-line region of a mature Polish specimen showing details of internal structure, *t* tooth, *hp* hinge plate, *ds* dorsal septum; × 7.5.

and almost parallel lateral margins; shell gently biconvex; highest surface of the pedicle valve at midpoint, in the brachial valve it is in the umbonal region. Along the lateral and anterior margins of the valve initial radial ornamentation begins at a distance of 2 mm from the apex. It consists of very fine striae, nearly one and a half millimeter long, 12 on each valve. Subsequently they develop into radial folds. Concentric growth lines closely and occasionally regularly spaced, particularly on posterior and central portions of both valves. In shells from 4 to 7 mm long (text-pl. I, fig. 2 a-8 a), features of specific morphology are mostly well differentiated; shell displays a stronger length than width-growth. In most cases the outline is pentagonal, posterior margins of the pentagon correspond to the umbonal ridges forming an acute angle; the lateral margins are subparallel or strongly divergent anteriorly, and the base or anterior margin is straight or gently rounded. Shell equally biconvex along whole length; hinge-ears usually present, but not always readily discernible; lateral margins more or less divergent, while anterior margin straight or rounded.

Fig. 3. — *Peregrinella multicarinata* (Lamarck); *a-e* a series of cross sections of a Polish specimen, showing dorsal elements of internal structure, *hp* hinge plate, *cp* crural process, *ds* dorsal septum, *c* crura; × 6.

Radial striae already observable on the surface of both valves at a distance from 1.5 to 2 mm from apex; their number varies from 15 to 18, being usually the same on both valves. Striae though fine, are well marked, the ridges and interstrial spaces being sharp. Postero-lateral slopes of both valves covered by closely spaced, concentric growth lines only, discernible on the whole surface of the shell.

The next group of specimens includes shells from 7 to 11 mm in length (pl. I, fig. 1-3; text-pl. I, fig. 9a to 13a). On the whole, they differ but little from the above described specimens. The presence should be, however, noted of shells with distinctly trigonal outline, in addition to those which are still pentagonal. In the former case strongly divergent lateral margins are the continuation of beak ridges, while cardinal angles are sometimes indistinctly marked. Anterior margin, rounded or rectimarginate, corresponds to greatest width of shell. In this stage too, the shell is longer than wide. Striae are thicker and their number increases to 20 or even 22. As the shell grows, new striae appear by addition on the lateral slopes of both valves only.

Specimens, from 14 to 35 mm long (pl. III, fig. 1a-4a; text-pl. I, fig. 14-16a) are wider than long, in opposition to those in the above considered stage. Outline changes from trigonal to sub-trigonal or to sub-circular. Greatest width of shell shifted from the anterior margin towards the middle; lateral margins as well as anterior margin become rounded. In this stage, distinctly recognizable radial folds appear to replace striae of the former stage. In some specimens their number attains 32 on each valve. The appearance of individuals in this stage of ontogeny resembles quite closely that of adults. This is the final stage of a rather prolonged period of morphogeny. Subsequent changes affecting the adult shell will be connected with growth of dimensions only and thickness of shell. High radial folds will appear to replace the small folds, widening out to the front of the shell, while the sharpness of their ridges and furrows is gradually emphasized; the beak

thickens as the age of the individual advances and strongly curves over the brachial valve. These are gerontic characters.

It may be seen from above that extensive morphologic changes affect the shell in the course of its development. The external characters of the youngest individuals differ so much from those of the adults as to make impossible their specific identification and impede even their generic determination. Stress should be laid, in the first place, on the following characters subject to extensive ontogenic changes: 1) external shell outline altering from pentagonal to trigonal and finally to circular; 2) greatest width of shell which corresponds to the anterior margin during the youngest stages of ontogeny and shifts toward the middle of shell in adults; 3) length/width radio: in juvenile individuals the length exceeds the width while in adolescents the width is equal to or even exceeds its length.

For better illustration a table is here given, with 25 specimens in various stages of ontogeny, listing their length, width and thickness, as well as length of hinge-line and number of folds in the ventral and dorsal valves (see p. 34-35).

The ornamentation changes from tiny radial striae through small folds into distinct, thick folds. It should be stressed that the radial ornamentation is on the whole very regular in all stages of ontogeny. As has already been pointed out, new folds appear independently of the thickness of shell on the slopes of valves only, usually 2 or 4 on each valve. In some very rare cases, however, (observed on 4 specimens), this regularity of arrangement is somewhat disturbed. As a rule, in these cases, one of the folds situated at nearly midlength of shell divides. Naturally, there is correspondence between the bifurcation of fold in the dorsal and ventral valves. Owing, however, to its extreme rarity the bifurcation should be regarded as incidental.

Individual variability. The observation of changes taking place during ontogeny leads to the conclusion that there are only very few characters which do not undergo any changes, others than those connected with growth. To say, the hinge-line is always arcuate, gently curving at midlength in all specimens, whether young or mature. As the width of the shell increases the hinge-line becomes elongated. The lateral and anterior commissures are zigzag in all those stages of ontogeny, the nepionic stage excepted, in which there are no striae. In young specimens the zigzag commissure joining the two valves is not so conspicuous. As the folds thicken, along with advancing growth, the commissure becomes more marked, showing sharp ridges and furrows. The planarea is slightly curved in all the specimens, from the youngest to the oldest. Details of internal morphology as the hinge plates, the dorsal septum and crura are subject to changes of growth only. As individuals attain their maturity,

Dimensions of specimens in various stages of ontogeny (in mm)

No.	Length	Width	Thickness	Length of hinge-line	Number of folds $\frac{v}{d}$
1	3.8	3.0	1.0	1.3	$\frac{12}{12}$
2	5.5	3.8	1.5	1.5	$\frac{18}{18}$
3	6.5	5.6	1.7	2.2	$\frac{18}{18}$
4	7.0	5.2	2.0	2.0	$\frac{20}{21}$
5	8.9	7.7	3.3	3.6	$\frac{19}{19}$
6	9.5	8.4	3.0	4.4	$\frac{16}{16}$
7	10.0	8.5	2.9	4.1	$\frac{22}{22}$
8	10.8	9.6	3.1	5.7	$\frac{23}{23}$
9	12.3	10.4	3.9	6.1	$\frac{22}{22}$
10	13.8	11.5	4.8	6.2	$\frac{22}{22}$
11	15.3	14.8	6.2	8.6	$\frac{24}{24}$
12	17.4	16.6	6.3	8.0	$\frac{25}{24}$
13	21.5	21.8	7.7	15.9	$\frac{35}{33}$
14	30.0	31.0	14.4	19.1	$\frac{34}{32}$
15	31.8	34.0	12.8	20.8	$\frac{35}{33}$
16	38.5	34.9	15.3	26.6	$\frac{26}{26}$
17	40.8	40.0	17.0	26.7	$\frac{32}{32}$

Dimensions of specimens in various stages of ontogeny (in mm)
(continued)

No.	Length	Width	Thickness	Length of hinge-line	Number of folds $\frac{v}{d}$
18	50.9	50.9	26.5	34.3	$\frac{35}{35}$
19	61.0	59.0	30.3	30.2	$\frac{41}{39}$
20	63.4	64.7	36.0	43.7	$\frac{44}{43}$
21	71.6	73.7	44.0	43.2	$\frac{33}{32}$
22	78.7	81.0	44.4	47.5	$\frac{33}{34}$
23	81.8	94.5	50.0	53.2	$\frac{35}{34}$
24	82.0	85.3	47.9	46.9	$\frac{33}{33}$
25	98.6	120.6	56.2	65.0	$\frac{35}{35}$

these structures chiefly increase in length and but slightly in thickness and width. No great morphologic changes take place throughout their ontogeny.

Extensive variability, both ontogenic and individual, indicates the great plasticity of the species connected probably even with minor changes of environment. Some writers have already turned their attention to the great individual variability of this brachiopod. Renngarten (1924), among others, asserted it to be displayed mostly in the ornamentation and thickness of shell.

Our observations lead to the inference that individual variability affects practically all morphological characters. The ornamentation only keeps the same character throughout all stages of ontogeny, namely: striae in young specimens, small folds in older ones, as well as folds in adults, are well marked, moderately high, with rather sharp ridges and furrows. In consequence, the lateral and anterior commissures are always zigzag. But the number of folds on the surface of shell is not uniform, and varies considerably. At a distance of about 2 mm from the apex (as measured in 20 specimens) the number of folds is from 12 to 20; being from 16 to 30 and from 33 to 50 at the respective distance of 10 and 55 mm from the

apex. It should be pointed out that no definite boundary line may be laid down between specimens displaying a smaller or greater number of folds, as intermediate cases also occur. For example, the maximum number of folds in specimens, whose shell length attains from 35 to 60 mm, is up to 50, the minimum being 33. On the other hand, there are also specimens of the same individual age provided with 34, 36, 42, 44 and 46 folds. Consequently, the number and thickness of folds are doubtlessly assignable to individual variability.

When less numerous, the folds are thicker and wider, being slighter and somewhat higher when more numerous.

Differences in the number of folds are also observable in specimens from France and other countries. Among his specimens from Transsylvania, Toula (1911) has observed individuals with more and less numerous folds. All these shells, independently of differences in ornamentation, have by Toula been referred to *Peregrinella multicarinata* (Lamarck). On the other hand, Renngarten (1924) on evidence of two characters: thickness of shell and number of folds, has distinguished two varieties among specimens from the Caucasus. One of these varieties, named *„pinguis"*, is characterized by the thickness and smaller number of folds and considerable thickness of shell. The other one, called *„typica"* by that author, displays thinner and hence more numerous folds, while the thickness of shell is far smaller.

It is on the whole somewhat difficult to select from among the Polish and French specimens available to the writer some feature of morphology associated with the character of folds. Even the thickness of all the shells, independently of the number of folds, is nearly uniformly moderate, contrary to that in specimens from the Caucasus. The French specimens, with more numerous folds, are flattened out to a greater extent posteriorly, contrary to specimens with thicker folds in which the umbonal part of the brachial valve is more arched. In all probability, however, this feature involving the flattening at the umbonal part, is not confined to specimens with thinner folds only. Toula (1911, pl. 3, fig. 2 a) figures a specimen with about 50 thin folds, not displaying any flattened umbonal part, but, on the contrary, rather strongly convex, as in the thickly folded shells.

The variability of the external outline is more conspicuous in adults than in young individuals. This has been shown by measurements carried out in the case of 16 young specimens, suitable for this purpose, with length of shell up to 13 mm, as well as in the case of 25 adults. In juvenile individuals the width/length ratio varies between 0.8 and 0.9, with the predominance of the 0.9. The thickness/width ratio varies between 0.3 and 0.5, the majority of specimens being grouped at the 0.4 index.

In adults the width/length ratio varies between 0.9 and 1.4, the most frequent one being 1.0. The thickness/width ratio is here between 0.4 and 0.7, with most specimens at the 0.5 index.

In the chapter dealing with ontogeny the writer has mentioned that two principal types of outline may be differentiated among youthful individuals: the pentagonal dominating among individuals attaining a length of up to 7 mm, and the trigonal, characteristic of somewhat older individuals, with length up to 15 mm. As is figured in text-pl. I, fig. 1 a-14 a, the young individuals, with length from 4 to 15 mm, display various forms of shell, intermediate between the pentagonal and the trigonal form.

In some youthful individuals the lateral margins are rectilinear or slightly concave. They may be either sub-parallel to each other, or more or less divergent.

The anterior commissure of young individuals may also be either straight or somewhat rounded (text-pl. I, fig. 1 a-11 a).

Considerable oscillation is observed in the length of the hinge-line in young individuals. It depends on the degree of development of ear-like prolongations of the hinge-line. These ears show great lack of uniformity in their development. In some individuals they are barely discernible, while in others they are distinctly marked (text-pl. I, fig. 1 a-13 a).

Comparisons. Upon comparing the Polish specimens with those from France and with descriptions and figures of other specimens recorded from various sites outside of France, it is possible to assert their close resemblance. Although the Polish specimens are few and mostly damaged, yet they provide adequate evidence for the doubtless identification of this characteristic species. This is suggested by the identity of such features as the rounded external form of shell, form of the hinge-line and of beak, details of ornamentation and the development of but few elements of internal morphology, to say dorsal septum, long, thin and almost parallel crura. Taking into consideration the strong individual variability, the material here studied does not lead to the establishment of more than very few features in which the Polish specimens differ from the French. One of the chief differences is the conspicuously smaller size of Polish adult individuals. The length of our specimens from Poland does not exceed 60 mm, while it attains 100 mm in those from France. Besides this the folds in the Polish specimens seem sharper. On these two characters the Polish specimens might perhaps be reasonably established into a new subspecies with the suggestion that the existing differences may have developed owing to environmental conditions prevailing in the Carpathian Basin. Yet, owing to the decidedly small number of adult individuals available to the writer, she cannot ascertain the extent of con-

stancy of the differences and, therefore, considers the Polish form as conspecific with *Peregrinella multicarinata* (Lamarck) from France.

The form figured by Quenstedt (1871, pl. 40, fig. 96-100) differs somewhat in its outward appearance from the typical specimens from both France and Poland. That author himself actually points out that the specimen figured by him belongs to the „longer" variety with moderate dimensions, thereby stressing the existence of a difference in the length/width ratio of the shell. This feature, as has been ascertained on the ontogeny of the Polish specimens, is characteristic of youthful individuals. In adult specimens, on the other hand, the length of shell is equal to its width, many a time it is even less; measurements of 35 French specimens belonging to adult individuals confirm this. But the study of more ample material is needed to determine whether this feature, in which Quenstedt's specimens differs from others, is one of individual variability or if it is a constant feature leading to the establishment of a new variety or species. Besides this feature, the beak in the specimen figured by Quenstedt is considerably larger and stouter than that in the Polish form.

E. Ascher (1906, pl. 14) has described and figured the dorsal valve of a young *Peregrinella peregrina* from the Grodziszcze (Grödischter) beds. As compared to specimens of about the same age, collected from Poland, it differs in having markedly thinner and consequently more numerous folds (about 50) and in the presence of clearly distinct hinge ears. Also, its cardinal angles are almost straight. That writer describes and figures another form which she refers to a new species, *Rhynchonella silesica* Ascher, recorded from the same Grodziszcze beds. Two specimens of this form were available to her. One of them belongs to a mature individual, the other is young. The young specimen of *Rh. silesica* Ascher, which has been figured and displays a most regular pattern of ornamentation, does not at all seem to dissemble the young Polish specimens. Its outward appearance is, in fact, identical. This new form, which its author believes to be very much like *Rh. peregrina,* may perhaps be its variety. The main difference lies in ornamentation. In *Rh. silesica* new folds are mostly due to bifurcation. Consequently the zigzag commissure, so regular in *Peregrinella multicarinata,* loses some of its regularity in *Rh. silesica* (fig. 4). As mentioned before on p. 33, occasional bifurcation of folds has also been observed by the present writer in four French specimens. Considering, however, the extreme rarity of its occurrence the present writer is inclined to regard it as incidental. It is nonetheless interesting in connection with the predominant bifurcation of folds in *Rh. silesica.* Observations of the ornamentation in *Rh. silesica* involving a greater number of specimens might be of some interest.

The Transsylvanian specimens described by Toula (1911) differ considerably from Polish ones. In the first place they are of greater dimensions and exceedingly wide. In the umbonal region the brachial valve is strongly arched in a semicircle, while it is gently convex anteriorly;

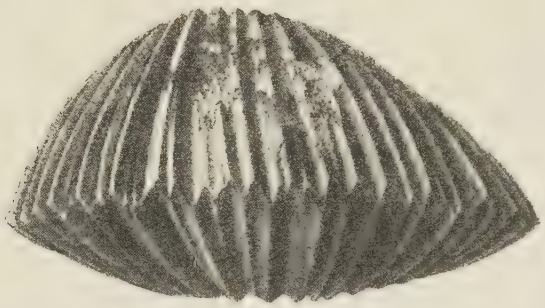


Fig. 4. — *Rhynchonella silesica* Ascher as figured by E. Ascher in 1906. Note irregular zigzag anterior commissure; nat. size.

whereas in Polish specimens it is gently convex along the midline from beak to front. The number of folds is almost the same in both, the Polish and the Transsylvanian specimens. Specimens of young individuals figured by Toula (1911) differ considerably from Polish specimens, in the conspicuously thinner and more numerous small folds (about 50), in the greater length of the hinge-line and in the more distinctly marked hinge ears. In Polish specimens, of about the same length as in those from Transsylvania, the number of folds oscillates between 20 and 32. It might also be mentioned here that the three young specimens from France available to the writer, in their outward appearance very closely resemble the shells of the same age figured by Toula.

As compared with specimens from the Caucasus, the Polish specimens come very close to Renngarten's variety of *Peregrinella multicarinata* var. *typica*. The resemblance lies in ornamentation, since the folds in this variety are of a similar thickness. So is the convexity in specimens from Poland and the Caucasus very much the same. The shell is regularly and gently biconvex along the whole length. The main difference is in the considerably larger size of specimens from the Caucasus, its length, as figured, being equal to the width and measuring about 100 mm.

Peregrinella multicarinata var. *pinguis*, another variety differentiated by Renngarten (1924), differs from the Polish specimens in the greater convexity of the shell. Its dorsal valve is strongly inflated along its entire length and arched in the umbonal part, as is also the form from Transsylvania, figured by Toula (1911). The folds of this variety are thicker and their furrows slightly wider. None of all the French specimens stud-

ied by the present writer have a length corresponding to that in *P. multicarinata* var. *pinguis*, their thickness being markedly smaller in specimens with thick folds. The French specimens with thinner folds belong to individuals who have reached their maturity, but are not yet old. Their shells are, therefore, weakly biconvex, the dorsal valves particularly so. The thickness of shell being, however, one of the gerontic characters in the brachiopods, it may be supposed to have increased with age in the French specimens and to be the same as in shells with thicker folds.

In a paper by Hertlein and Grant (1944) short mention is made about the Lower Cretaceous Californian species of *Peregrinella whitneyi* (Gabb) with a figure of the hypotype. On comparing this American species with the Polish specimens it is noted that the differences between them are not great. They consist in the larger size of the shell of *P. whitneyi* and the stronger convexity of both valves.

In summing up, the Polish specimens must be regarded as referable to species *Peregrinella multicarinata* (Lamarck). As has already been stressed here, the features in which the Carpathian form differs from the typical French form or from other forms recorded from Rumania, the Caucasus and elsewhere, are not important. Furthermore, the adult material from Poland is quite inadequate to impart a systematic value to the observed differences.

Possibly, the investigation of large numbers of specimens from various geographical areas may lead to the establishment within genus *Peregrinella* of species or varieties which will be assigned a more exact systematic position than has thus far been done.

DEFORMATIONS OF SHELL AND THEIR CONNECTION WITH ECOLOGICAL CONDITIONS

Deformations of shell produced during its life-time are not a rare occurrence in the case of *Peregrinella*. The material investigated by the present writer, though not very abundant, has provided many illustrative examples. These deformations affect: 1) external form of the shell which, occasionally, displays strong asymmetry recorded mainly in immature individuals, where the process of shell-growth was still going on; 2) surface of shell, without distinct alterations of its external shape. This type of deformation is observable on shells belonging to young, adult and old individuals.

The first type of deformation, stated here above, affects young individuals. Traces of it, however, are also discernible in mature individuals. When so, the lateral slopes of shell are not uniformly developed. As seen e. g. in text-pl. II, fig. 3, the left side of shell has developed normally, while the right is underdeveloped. Much more frequent is the under-

1

2

3

4a

4b

Peregrinella multicarinata (Lamarck)

Fig. 1. Young Polish specimen of asymmetric shape; note interrupted radial ornamentation; nat. size.

Fig. 2. Traces of compressions on surface of ventral valve of Polish specimen; nat. size.

Fig. 3. Deformation of external outline in a young Polish specimen; × 5.5.

Fig. 4. Damaged dorsal *(a)* and ventral *(b)* valves of a French specimen, nat. size.

1a

1b

2

3a

3b

Peregrinella multicarinata (Lamarck)

Fig. 1. Mature Polish specimen with ornamentation conspicuously deformed owing to damages; *a* dorsal view, *b* ventral view; nat. size.

Fig. 2. Traces of compressions on ventral valve of a young Polish specimen; nat. size.

Fig. 3. Specimen from France with ornamentation deformed owing to damage of shell, *a* dorsal valve, *b* ventral valve; nat. size.

development of one of the hinge ears. In some specimens one of the ears is clearly distinguishable, while the other one is only vestigial or altogether absent (text-pl. I, fig. 7 a, 13 a).

In some specimens, one may additionally observe poor development of one side of the planarea, a strongly curved beak etc. Various writers make mention of such like asymmetry in brachiopods. N. Bashmakova (*fide* T. G. Sarycheva, 1949) has, among others, observed and described the irregular development of the planarea and beak in *Choristites*. Irregularities of this kind, developed during the life time of individuals, are easily explained by density of monospecific population.

Many earlier workers have emphasized that some of the Lower Cretaceous limestone beds are crowded with *Peregrinella*. W. Kilian (1913) (1913) mentions the nest-like occurrence of this fossil. It is the same in the case of Polish specimens which were very much crowded in the discovered block. It is to infer that *Peregrinella* formed large and dense clusters with a predominance of young individuals, still attached to the substratum by means of a functional pedicle. The mechanical pressure bearing on any one part of the still growing shell must necessarily have impeded the growth of that part, resulting in the asymmetry of the form. It must also be stressed that deformation is displayed by either the right or the left side of the shell, probably depending on which side of the shell it touched another individual.

Similar examples of shell asymmetry of brachiopods may be encountered in densely crowded assemblages, yielded by *Stringocephalus* or *Bornhardtina* Middle Devonian beds. These forms constituting monospecific assemblages attain, under optimal life conditions, their maximal development as regards both their size and numbers of individuals. They took complete possession of their niche and populated them densely, so much so as to necessitate a struggle for life-space, a restriction which does by no means favour the regular growth of shells. Illustrations of the asymmetry of external form, due to crowded assemblages, are among others also given in a paper on Carboniferous Brachiopods by Sarycheva (1949).

In what regards the deformation of shell surfaces, those cases must of course be only considered that were produced during the life time of the specimens. Many shells belonging to both, young and mature specimens bear traces of considerable damages, subsequently healed up. Observations show these damages to have taken place mostly in the region of lateral and anterior margin and therefore relatively the thinnest parts. The damages are not confined to one valve only, but affect both valves simultaneously (text-pl. III, fig. 1 a, b & 3 a, b). On the shell a fairly large scar, mostly in the shape of a distinct thickenning is to

be seen where the damage occurred. But no check of any importance seems to have taken place and the formation of subsequent radial folds has not been stopped.

Close examination of all shells available has led the writer to detect numerous superficial damages separable into three groups:

1. A fairly distinct scar, consisting of a small thickening, is visible on the shell where the damage had occurred. The further development of radial ornamentation was disturbed. In consequence, the ornamentation differs strongly from the normal pattern. The arrangement of folds and the folds themselves are somewhat different, having an undulatory course, being thicker and less numerous. Many a time, instead of two normal folds, there will be but one (text-pl. II, fig. 4 a; text-pl. III, fig. 1 a, 3 a). Cases like this have been observed in mature individuals.

2. Both in young and mature individuals traces of damages are discernible, seen as very pronounced thickenings (text-pl. II, fig. 2; text-pl. III, fig. 1 b).

These were supposedly places of more intensive excretion of shell substance by the margins of the mantle. No longer interruption, however, occurred in the subsequent formation of radial ornamentation, which was continued in a nearly regular manner.

3. In some juvenile specimens it is to be noted that the development of further radial ornamentation in their anterior or lateral portions had been subjected to a check of short duration. This had involved a small area only, within which, instead of the radial folds, we can see distinct and frequently dilated concentric growth lines. After some time, however, the folds developed quite normally over the next portion of shell. An occurrence of this kind suggests a pressure made on this part of the shell by some foreign body, in consequence of which the radial folds failed to develop. As soon as the pressure had ceased, the development of the radial ornamentation continued quite normally (text-pl. II, fig. 1).

Taking into account all these observations it may be maintained that, outside of some disturbances and very brief checks to the development of ornamentation, growth in the damaged portions of shell continued almost normally if damage had been inflicted in the marginal regions.

In addition to damages of this type, quite numerous traces are sometimes discernible of pressure exercised upon the shell (pl. II, fig. 4 b; text-pl. III, fig. 2). They occur in various parts of the surface of the particular specimens, i. e. in the marginal as well as in the central region. It is not, however, always possible to distinguish these compressions from those formed during the process of diagenesis.

On the strongly curved ventral beak concealing the delthyrium, and on the large dimensions of mature shells, it seems that the functional

pedicle of young individuals was atrophied in the gerontic stage. Such specimens, it may be inferred, rested unattached at the bottom, on their ventral valves, keeping their balance thanks to the dilation of the ventral beak and pronounced elongation of the hinge-line.

Are the cephalopods, so densely populating the Cretaceous seas, to be made responsible for some of the here described damages? It would be difficult to answer this question with full certainty.

GEOGRAPHICAL DISTRIBUTION

Genus *Peregrinella* is commonly known as an important index fossil of the Middle Neocomian, all the more so that it shows a wide geographical distribution. It has been recorded from Lower Cretaceous beds both of Europe and North America.

It occurs mainly in a purely calcareous facies, but is not confined thereto, being also recorded from an arenaceous facies, i. e. from calcareous sandstones of the Cieszyn (Teschener) and Grodziszcze (Grödischter) beds, within the Carpatian Mts. Specimens from these beds differ slightly from the type forms, as has already been noted by some writers (Uhlig, 1901).

Typical specimens of *Peregrinella multicarinata* have been recorded from Middle Neocomian limestones in south-western France, at the localities of Châtillon, Rottier, Gigondas, La Charce, Chalançon etc. It has also been found in beds with *Serpula recta* Gold, at Montpellier and at Monte Gargano in Italy. Their occurrence has furthermore been noted in the north-western areas of the Carpathians, in Cieszyn (Teschin), Moravia, and in the vicinity of Wieliczka, Poland. In Germany they are probably known from the district of Werle in Mecklenburg.

Further to the east of Europe, *P. multicarinata* is found at the locality of Kronstadt (Brasov) in Transsylvania. Finally, fine specimens of this brachiopod have been obtained from western Kuban in northern Caucasus.

Outside of Europe, genus *Peregrinella* has thus far only been recorded from western California in North America (Napa County, Clear Lake, Wilbur Springs, Colusa County).

The occurrence of the same genus within Lower Cretaceous beds of both Europe and California is very interesting, particularly that observed in two such widely distant areas as California and the Caucasus. This has been stressed by Renngarten (1924), Hertlein and Grant (1944). Hertlein emphasizes also the close resemblance of some ammonites in these two regions. Renngarten supposes that the appearance of *Peregrinella* in the Upper Hauterivian sea of Europe was quite sudden. Its ancestors are not, as he states, known to us. The interesting fact of the

occurrence of this form in California, as early as in Valanginian times, makes this writer infer that *Peregrinella* migrated to Europe from the northern boreal sea of which the Californian Basin was a part.

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Warszawa, October 1956

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GERTRUDA BIERNAT

O *PEREGRINELLA MULTICARINATA* (LAMARCK) (BRACHIOPODA)

Streszczenie

Praca dotyczy *Peregrinella multicarinata* (Lamarck) — brachiopoda dolno-kredowego ważnego z uwagi na znaczenie stratygraficzne, jego rozwoju ontogenetycznego i zmienności osobniczej. Badania oparto na obfitującym w osobniki młode materiale polskim, odkrytym przez dr J. Burtan w okolicach Wieliczki w postaci kilku luźnych bloków skały ilasto-wapiennej, oraz na okazach z Francji wypożyczonych przez autorkę z Muzeum Paleontologicznego Uniwersytetu im. Humboldta w Berlinie. Zbadany tu rodzaj, spotykany zarówno w facji czysto wapiennej jak i wapienno-piaszczystej, ma duże rozprzestrzenienie geograficzne. Notowany jest w płd.-zachodniej Francji, we Włoszech (Monte Gargano), na Morawach i na Śląsku Cieszyńskim, w Rumunii (Siedmiogród), na Kaukazie (płn.-zachodnia część Kubania) oraz — poza Europą — w Ameryce Północnej, w zachodniej części Kalifornii.

Typowa *Peregrinella* została opisana po raz pierwszy z wapieni hoterywskich płd.-zachodniej Francji (okolice Châtillon) pod dwiema nazwami gatunkowymi: w 1819 r. jako *Terebratula multicarinata* Lamarck, a w 1835 r. jako *T. peregrina* Buch. Nazwa gatunkowa L. Bucha przyjęła się w literaturze późniejszej, chociaż

prawo pierwszeństwa przysługuje bezsprzecznie nazwie Lamarcka. W 1847 r. A. d'Orbigny zaliczył tę formę do wydzielonej już wówczas grupy rynchonel, a w 1887 r. D. P. Oehlert ustanowił dla niej nowy rodzaj — *Peregrinella*.

Z przeprowadzonych badań porównawczych wynika, że okazy polskie należy uznać za przynależne do gatunku *P. multicarinata* (Lamarck). Cechy, odróżniające polską formę od francuskiej typowej czy też od innych, pochodzących z Rumunii, Kaukazu itp., nie są znaczne. Materiał osobników dorosłych, pochodzący z Polski, jest zresztą niewystarczający, aby ewentualnie występujące drobne różnice uznać za cechy mające znaczenie systematyczne. Możliwe, że zbadanie dużej ilości okazów różnego pochodzenia geograficznego pozwoliłoby na wyróżnienie, w obrębie rodzaju *Peregrinella*, gatunków czy też odmian zdefiniowanych dokładniej, niż to uczyniono dotychczas.

Badania rozwoju ontogenetycznego przeprowadzone na okazach od 3,8 mm długości wykazały, że zmiany morfologiczne, jakim podlega muszla w ciągu jej rozwoju osobniczego, są bardzo znaczne. Okazy najmłodszych osobników mają wygląd nie podobny zupełnie do dorosłych. Odbiegają od nich w wielu cechach zewnętrznych tak, że dysponując tylko takimi okazami nie byłoby możliwe ich oznaczenie gatunkowe, a oznaczenie rodzajowe sprawiałoby wielką trudność. Dużym zmianom w ontogenezie podlegają następujące cechy:

1) zarys zewnętrzny muszli, zmieniający się od pięciobocznego poprzez trójkątny do okrągłego;

2) największa szerokość muszli, znajdująca się przy brzegu przednim — w najmłodszych stadiach rozwojowych, a przesuwająca się ku środkowi muszli w kierunku brzegu zawiasowego — u osobników dorastających;

3) stosunek długości do szerokości, długość bowiem osobników młodocianych jest większa niż szerokość, u dorastających zaś różnica ta się wyrównywuje i długość muszli równa się jej szerokości lub też w wielu przypadkach jest od niej mniejsza.

Zmienia się również urzeźbienie radialne na powierzchni muszli, począwszy od delikatnych prążków u okazów najmłodszych, poprzez fałdki, do grubych, wyraźnych fałdów. Urzeźbienie radialne we wszystkich stadiach rozwojowych jest na ogół bardzo prawidłowe. Nowe fałdy pojawiają się, niezależnie od grubości muszli, tylko na bocznych skłonach skorupek, zazwyczaj po 2 lub 4 na każdej.

Zaobserwowana duża zmienność osobnicza *Peregrinella* dotyczy tylko cech zewnętrznych muszli. Elementy struktury wewnętrznej, jak septum dorsalne i krura, ulegają jak się zdaje tylko zmianom wzrostowym, powiększa się bowiem ich długość oraz nieco szerokość i grubość. Duża zmienność osobnicza świadczyć może o wielkiej plastyczności gatunku, zależnie od drobnych odchyleń środowiskowych. Zmienność ta dotyczy prawie wszystkich cech morfologii zewnętrznej, a w szczególności urzeźbienia, tj. liczby fałdów oraz ich grubości. Zmienność zarysu zewnętrznego u okazów dorosłych jest również dość duża, u młodszych — mniejsza. Z pomiarów, wykonanych na 16 okazach młodych o długości muszli dochodzącej do 13 mm oraz na 25 okazach dorosłych, wynika, że stosunek szerokości muszli do dłu-

gości okazów młodych waha się w granicach od 0,8 do 0,9, przy czym najczęstszy jest 0,9. Stosunek grubości do szerokości mieści się w granicach 0,3—0,5, najwięcej zaś okazów grupuje się przy wskaźniku 0,4. U okazów dorosłych natomiast wskaźnik szerokości znajduje się w granicach 0,9—1,4, najczęstszy jest 1,0. Wskaźnik grubości waha się od 0,4 do 0,7 i przy wskaźniku 0,5 grupuje się najwięcej osobników.

Bardzo częste są przyżyciowe deformacje muszli. Dotyczą one jej zarysu zewnętrznego, wyrażonego niekiedy silną asymetrią. Zachodzi to głównie wśród okazów młodych, u których trwa jeszcze proces wzrostu muszli. Prócz tego obserwuje się je na powierzchni skorupek, bez wyraźnego zniekształcenia wyglądu zewnętrznego muszli, zarówno u osobników młodych jak też u dorosłych i starych. Deformacje te są wynikiem uszkodzeń zachodzących przeważnie w okolicach brzegów bocznych i przednich muszli, a więc w częściach najmłodszych, a tym samym stosunkowo najcieńszych. Uszkodzenia te można ująć w trzy grupy:

1) w miejscu uszkodzenia widoczna jest na muszli blizna w postaci niewielkiego zgrubienia (text-pl. II, fig. 4 a; text-pl. III, fig. 1 a, 3 a). W dalszym tworzeniu radialnego urzeźbienia nastąpiło zaburzenie, przebieg więc fałdów jak i same fałdy są nieco inne, biegną bowiem faliście, są grubsze i mniej liczne;

2) na muszli widnieją ślady uszkodzenia w kształcie niekiedy mocno zaznaczonego zgrubienia (text-pl. II, fig. 2; text-pl. III, fig. 1 b). Prawdopodobnie w tym miejscu wydzielanie węglanu wapnia przez brzegi płaszcza było intensywniejsze. W dalszym tworzeniu się fałdów nie było jednak dłuższej przerwy i były one kontynuowane w sposób prawie zupełnie regularny;

3) krótkotrwałe zahamowanie w tworzeniu dalszego radialnego urzeźbienia, co zachodzi na niewielkiej przestrzeni (text-pl. II, fig. 1).

Na podstawie dokonanych obserwacji można twierdzić, że dalszy wzrost w uszkodzonej części muszli, w przypadku uszkodzeń w okolicach brzeżnych, odbywał się na ogół prawie normalnie. Działo się to być może dlatego, że zranienie przypadło na brzeżną część muszli, a więc tam, gdzie brzeg płaszcza wydziela ciągle substancję skorupkową. Prócz wymienionych uszkodzeń, można zaobserwować dość liczne ślady wgnieceń skorupki w różnych miejscach na powierzchni okazów. Nie zawsze jednak można odróżnić wgniecenia przyżyciowe od tych, które powstały w procesie diagenezy. Wgniecenia przyżyciowe przypisać należy zapewne nadmiernemu zgęszczeniu osobników młodych w pewnych niszach ekologicznych.

OBJAŚNIENIA DO ILUSTRACJI

Fig 1 (p. 23)

Terebratula multicarinata opisana przez J. B. Lamarcka (1819) i zilustrowana przez T. Davidsona w 1850 r.; rys. nieco zmniejszony. (Wielk. natur. oryginału: dług. i szer. 7,62 cm, grub. 4,44 cm).

Fig. 2 (p. 31)

Peregrinella multicarinata (Lamarck). Przekrój poprzeczny w okolicy brzegu zawiasowego okazu dorosłego, pochodzącego z Polski, ilustrujący elementy struktury wewnętrznej; *t* zęby, *hp* płytka zawiasowa, *ds* septum dorsalne; × 7,5.

Fig. 3 (p. 32)

Peregrinella multicarinata (Lamarck). *a-e* seria szlifów, wykonanych na okazie pochodzącym z Polski, ilustrujących elementy dorsalne struktury wewnętrznej; *hp* płytka zawiasowa, *cp* listewka kruralna, *ds* septum dorsalne, *c* krura; × 6.

Fig. 4 (p. 39)

Rhynchonella silesica Ascher, ilustrowana przez E. Ascher w 1906 r. Widoczna nieregularnie zygzakowata komisura przednia; wielk. nat.

Tabl. I (p. 28/29)

Szkic geologiczny na S od Wieliczki, wg Dr J. Burtan
(1 : 100.000)

1 warstwy krośnieńskie, *2* w. istebniańskie, *3* w. godulskie, *4* w. lgockie, *5*. w. wierzowickie, *6* w. grodziskie;
7 Miocen, *8* jednostka podśląska, *9* jednostka śląska.

Text-Pl. I (p. 30/31)

Fig. 1-16. Szesnaście młodych okazów *Peregrinella multicarinata* (Lamarck) w różnych stadiach wzrostu, pochodzących z Polski; *a* od strony dorsalnej, *b* od strony wentralnej, *c* z profilu. Widoczna zmienność w zarysie zewnętrznym muszli, długości brzegu zawiasowego i grubości muszli; × 3,3.

Text-Pl. II (p. 40-41)

Peregrinella multicarinata (Lamarck)

Fig. 1. Asymetryczny w kształcie młody okaz pochodzący z Polski, widoczne zahamowanie w urzeźbieniu radialnym; wielk. nat.

Fig. 2. Widoczne ślady wgnieceń na powierzchni skorupki wentralnej okazu z Polski; wielk. nat.

Fig. 3. Deformacja w zarysie zewnętrznym młodego okazu z Polski; × 5,5.

Fig. 4. Uszkodzenia muszli pochodzącej z Francji, widoczne na skorupce dorsalnej (*a*) i wentralnej (*b*); wielk. nat.

Text-Pl. III (p. 40/41)

Peregrinella multicarinata (Lamarck)

Fig. 1. Okaz dorosły pochodzący z Polski, z wyraźnymi zaburzeniami w urzeźbieniu wskutek uszkodzenia; *a* od strony dorsalnej, *b* od strony wentralnej; wielk. nat.

Fig. 2. Widoczne ślady wgnieceń na skorupce wentralnej okazu z Polski; wielk. nat.

Fig. 3. Okaz z Francji, widoczne zaburzenia w urzeźbieniu wskutek uszkodzenia muszli; *a* od strony dorsalnej, *b* od strony wentralnej; wielk. nat.

Plansze poza tekstem

(wszystkie okazy w wielkości naturalnej)

Pl. I

Peregrinella multicarinata (Lamarck), Polska

Fig. 1-6. Sześć muszli różnego wieku; 1 *a* - 3 *a*, 4, 5, 6 *a* od strony wentralnej, 1 *b* - 3 *b*, 6 *b* od strony dorsalnej, 6 *c* z profilu.

Pl. II

Peregrinella multicarinata (Lamarck)

Fig. 1. Okaz dorosły z Polski: *a* od strony wentralnej, *b* od strony dorsalnej, *c* z profilu.

Fig. 2. Okaz dorosły z Francji: *a* od strony wentralnej, *b* od strony dorsalnej.

Pl. III

Peregrinella multicarinata (Lamarck), Francja

Fig. 1-4. Seria okazów różnego wieku; 1 *a* - 4 *a* od strony wentralnej, 1 *b* - 4 *b* od strony dorsalnej, 2 *c* - 3 *c* z profilu; 1 *c* okaz z profilu, ilustrowany również na pl. IV fig. 1 *a*, *b*.

Pl. IV

Peregrinella multicarinata (Lamarck), Francja

Fig. 1. Okaz dorosły: *a* od strony wentralnej, *b* od strony dorsalnej.

Fig. 2. Jeden z oryginalnych okazów L. Bucha: *a* od strony wentralnej, *b* od strony dorsalnej, *c* z profilu, *d* od strony brzegu zawiasowego, *e* od strony brzegu przedniego.

Pl. V

Peregrinella multicarinata (Lamarck), Francja

Fig. 1, 2. Dwa okazy dorosłe: *a* od strony wentralnej, *b* od strony dorsalnej.

Pl. VI

Peregrinella multicarinata (Lamarck), Francja

Fig. 1. Okaz dorosły: *a* od strony wentralnej, *b* od strony dorsalnej.

Fig. 2 *b*. Okaz dorosły z pl. V (2 *a*) od strony dorsalnej.

Pl. VII

Peregrinella multicarinata (Lamarck), Francja

Fig. 1. Okaz dorosły: *a* od strony wentralnej, *b* od strony dorsalnej.

Pl. VIII

Peregrinella multicarinata (Lamarck), Francja

Fig. 1 *c*. Okaz dorosły z pl. VII (1 *a*, *b*), widziany z profilu.

Fig. 2. Okaz dorosły: *a* od strony wentralnej, *b* z profilu.

ГЕРТРУДА БЕРНАТ

PEREGRINELLA MULTICARINATA (LAMARCK) (BRACHIOPODA)

Резюме

В статье приведены результаты исследований над видом *Peregrinella multicarinata* (Lamarck). Были учтены как онтогенетическое развитие так и изменчивость особей этой формы. Исследования производились на польском материале из окрестностей Велички, извлеченном из нескольких мергелисто-известняковых блоков богатых молодыми особями, а также на экземплярах происходящих из юго-западной Франции. Этот брахиопод встречается в нижнем мелу чисто известняковой и известняково-песчанистой фациях. Он имеет большое

географическое распространение. Впервые *Peregrinella multicarinata* была описана из готеривских известняков юго-западной Франции, окрестности Шатийон (Châtillon) Ламарком (J. B. Lamarck) в 1819 г. под названием *Terebratula multicarinata* Lamarck. В 1835 г. ее описал Бух (L. v. Buch) как *T. peregrina* Buch. Видовое название Буха принялось в позднейшей литературе, хотя право приоритета принадлежит бесспорно Ламарку. В 1887 г. Элерт (D. P. Oehlert) установил для этой формы новый род *Peregrinella*. Сравнительное изучение показывает, что польские экземпляры следует считать принадлежащими виду *P. multicarinata* (Lamarck), а немногие черты отличающие их от экземпляров из Франции можно признать проявлением индивидуальной изменчивости. Проведенные исследования онтогенетического развития выявили, что морфологическая изменчивость раковины в течение развития особи очень значительна. Экземпляры наиболее молодых особей по внешнему виду совершенно не похожи на раковины взрослых особей так, что только на их основании не было бы возможности видового определения, а родовое определение было бы связано с большими трудностями. Большим изменениям в онтогенезе подвержены: 1) внешнее очертание раковины, 2) ее максимальная ширина, 3) отношение длины к ширине. Также радиальная скульптура изменяется значительно; начиная с тонких полосок у молодых особей, через этап мелких ребрышек и кончая грубыми и отчетливыми складками у взрослых особей. Индивидуальная изменчивость рода ограничивается лишь внешними признаками раковины. Элементы внутренней структуры подвергаются лишь ростовым изменениям — увеличивается их длина, в некоторой степени ширина и толщина. Большая изменчивость особей может свидетельствовать о значительной пластичности вида в зависимости даже от незначительных изменений среды.

PLATES

Pl. I

Peregrinella multicarinata (Lamarck), Poland

Fig. 1-6. Six shells of various age: 1 *a*-3 *a*, 4, 5, 6 *a* ventral view, 1 *b*-3 *b*, 6 *b* dorsal view, 6 *c* lateral view.

Pl. II

Peregrinella multicarinata (Lamarck)

Fig. 1. Mature Polish specimen: *a* ventral view, *b* dorsal view, *c* lateral view.
Fig. 2. Mature French specimen: *a* ventral view, *b* dorsal view.

Pl. III

Peregrinella multicarinata (Lamarck), France

Fig. 1-4. Series of specimens of various age: 1 *a*-4 *a* ventral view, 1 *b*-4 *b* dorsal view, 2 *c*-3 *c* lateral view, 1 c lateral view, also figured in pl. IV fig. 1 *a*, *b*.

Pl. IV

Peregrinella multicarinata (Lamarck), France

Fig. 1. Mature specimen: *a* ventral view, *b* dorsal view.
Fig. 2. One of L. v. Buch's original specimens: *a* ventral view, *b* dorsal view, *c* lateral view, *d* hinge-line view, *e* anterior margin view.

Pl. V

Peregrinella multicarinata (Lamarck), France

Fig. 1, 2. Two mature specimens: *a* ventral view, *b* dorsal view.

Pl. VI

Peregrinella multicarinata (Lamarck), France

Fig. 1. Mature specimen: *a* ventral view, *b* dorsal view.
Fig. 2*b*. Mature specimen from pl. V (2 *a*) seen dorsally.

Pl. VII

Peregrinella multicarinata (Lamarck), France

Fig. 1. Mature specimen: *a* ventral view, *b* dorsal view.

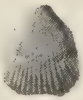
Pl. VIII

Peregrinella multicarinata (Lamarck), France

Fig. 1 c. Mature specimen from pl. VII (1 *a*, *b*), lateral view.
Fig. 2. Mature specimen: *a* ventral view, *b* lateral view.

All figures in natural size.

1a



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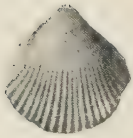

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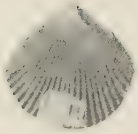

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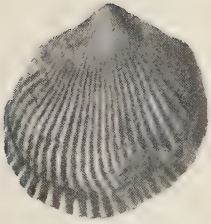

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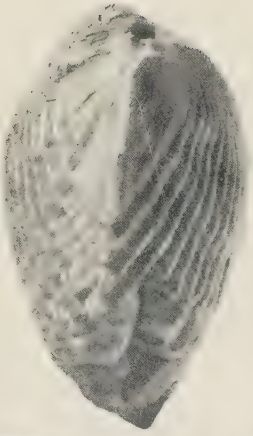

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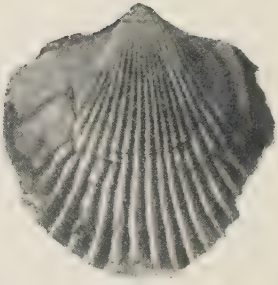

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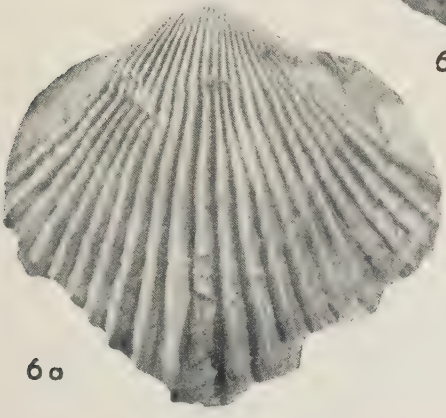

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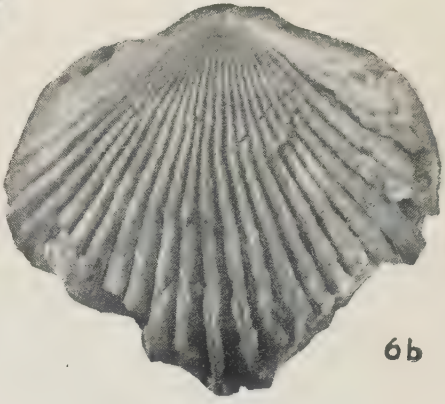

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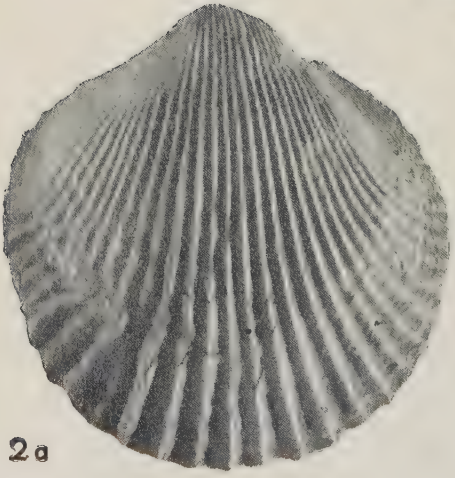

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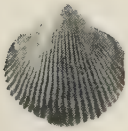

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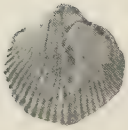

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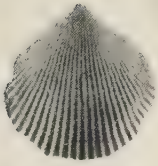

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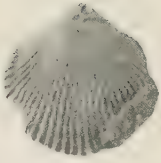

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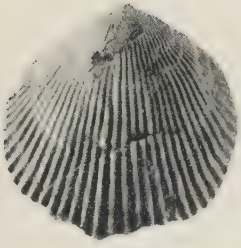

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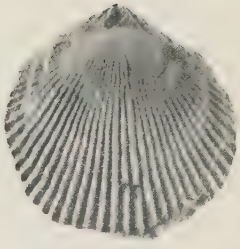

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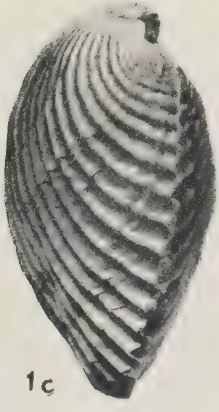

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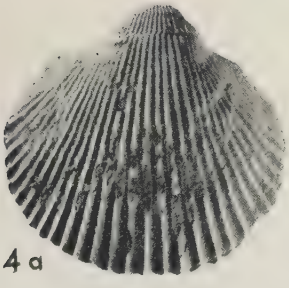

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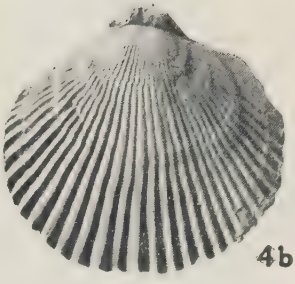

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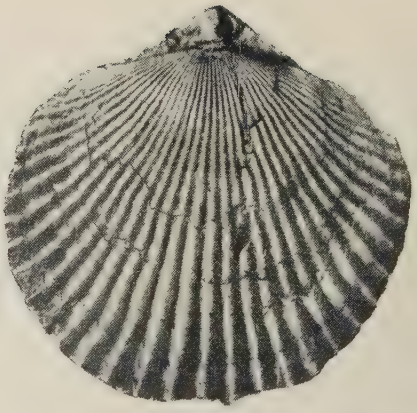

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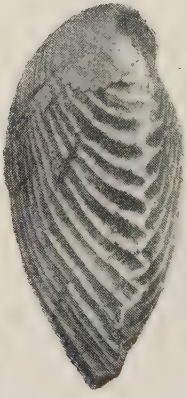

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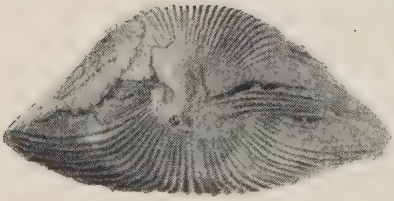

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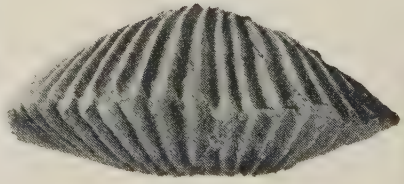

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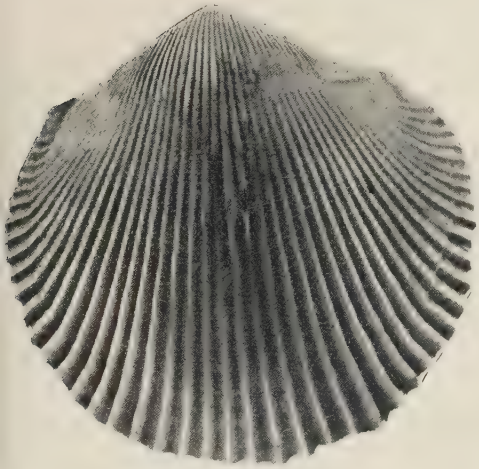

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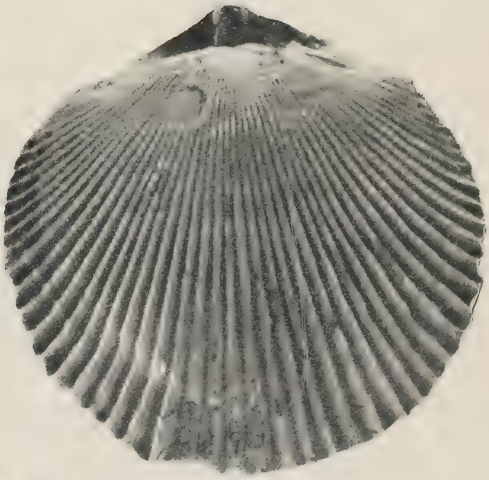

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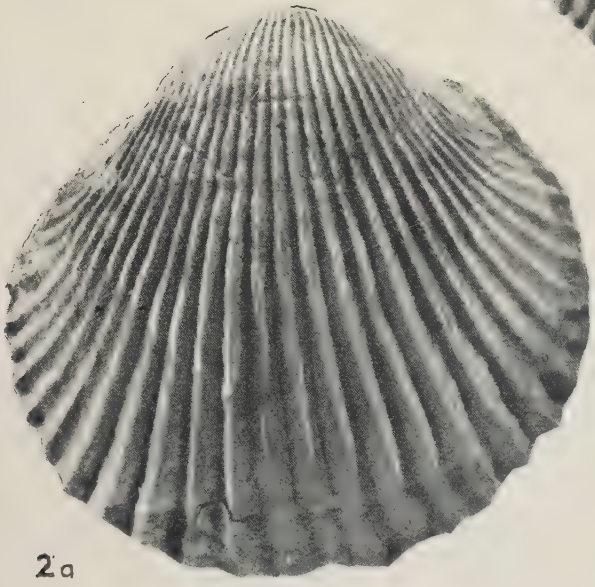

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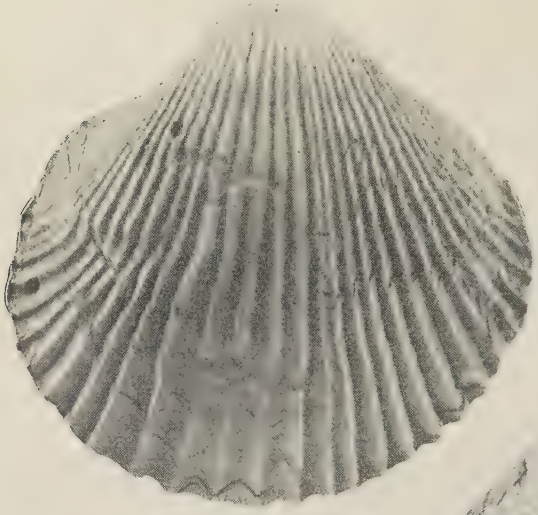

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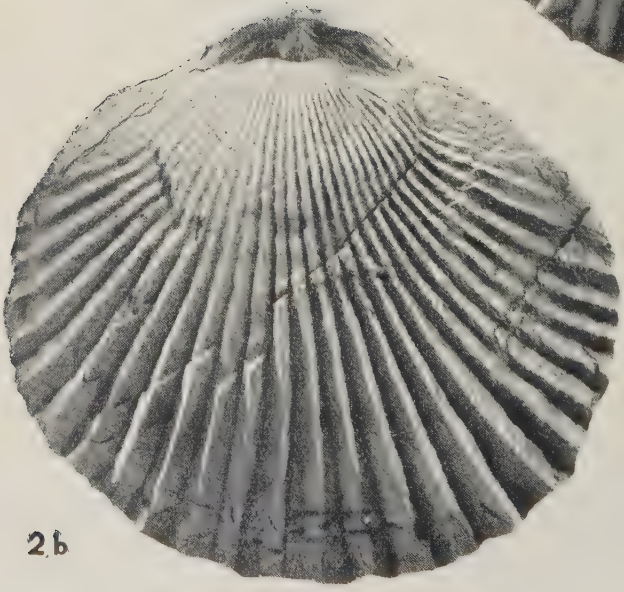

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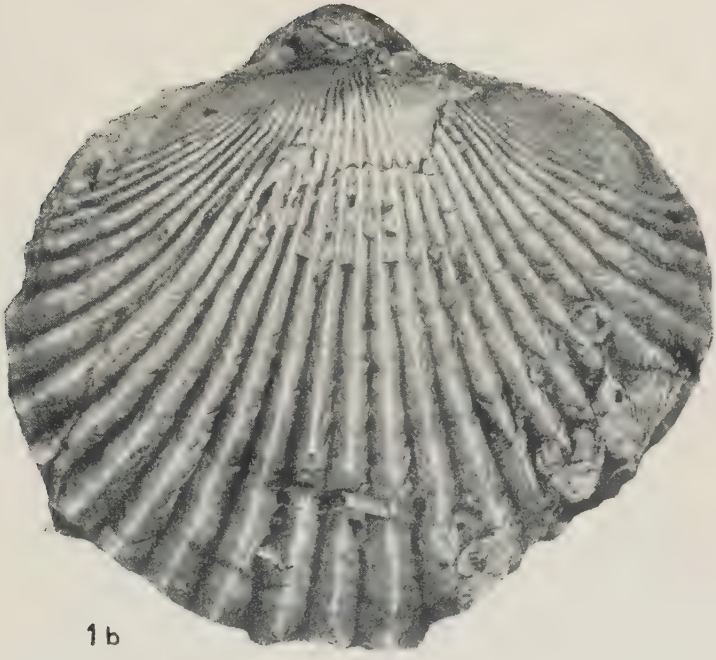

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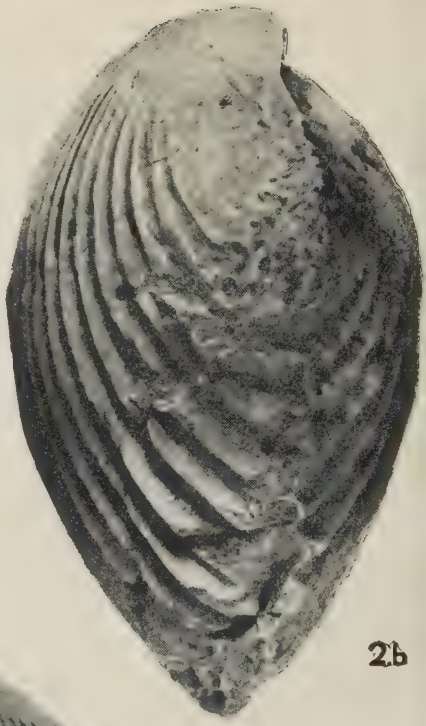

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ACTA PALAEONTOLOGICA POLONICA
Vol. II 1957 No. 1

HALSZKA OSMÓLSKA

TRILOBITES FROM THE COUVINIAN OF WYDRYSZÓW (HOLY CROSS MTS., POLAND)

Abstract. — This paper deals with 13 species of Couvinian Trilobites from Wydryszów. In addition to species previously recorded from the Holy Cross Mts. the writer describes some others not known so far from Poland and 3 new species.

INTRODUCTION

The material here described has been collected by the present writer in the Holy Cross Mts., at the locality of Wydryszów, to the north-east of Kielce. The paper has been prepared at the Paleozoological Laboratory of the Polish Academy of Sciences at the inspiration and under the guidance of Dr. Zofia Kielan to whom sincere thanks are due for her advice, assistance in the selection of literature and criticism of the manuscript. The writer is also most indebted to Mrs. M. Pajchel for her most valuable suggestions concerning the stratigraphy of the deposits from which the studied material has been collected. To Miss M. Czarnocka the writer is grateful for the photographs.

STRATIGRAPHIC AND GEOGRAPHIC DISTRIBUTION OF THE DISCUSSED SPECIES

The Couvinian fauna from Wydryszów has been described by the late J. Czarnocki, but both, the respective manuscripts and the collections of this author, were in 1944 destroyed in Warsaw. Czarnocki (1950) has assigned to the Couvinian the deposits of Wydryszów, regarding this stage as intermediate between the Lower and the Middle Devonian. He also tentatively listed then the Wydryszów fauna, mentioning the following trilobitic species: *Otarion* cf. *hydrocephala* Roem., *Proetus* cf. *cuvieri* Stein., *Proetus* sp., cf. *Pteroparia* sp., *Phacops (Phacops)* cf. *major* Barr., *Ph. (Ph.)* cf. *potieri* Bayle, *Acaste (Acastoides) paeckelmanni* R. & E. Richter, *Asteropyge rotundifrons* R. & E. Richter, *Asteropyge* n. sp.

Out of these species, the present writer has only found *Acaste (Acatoides) paeckelmanni* R. & E. Richter.

The trilobitic fauna from Wydryszów, though numerically meagre, is rather strongly differentiated. Some of the species are in the writer's collection represented by single specimens only, hindering their exact classification. These are namely: *Proetus (Proetus)* sp. A, *Pr. (Pr.)* sp. B, *Scutellum (Scutellum)* sp., and *Cyrtosymbole?* sp.

Among the here discussed species some are known from Germany and Czechoslovakia, e. g. *Otarion (Otarion) convexum* (Hawle & Corda, 1847), *Leonaspis (Leonaspis) laportei* (Hawle & Corda, 1847), *Scutellum (Paralejurus) dormitzeri dormitzeri* (Barr., 1852). An interesting fact is the presence in the Polish material of *Acaste (Acastoides) paeckelmanni* R. & E. Richter, 1939, thus far recorded from Turkey only.

The majority of the discussed Trilobites are species recorded from the Couvinian, while three of them have been described from the Lower Devonian, i. e. *Otarion (Otarion) convexum* (Hawle & Corda), *Leonaspis (Leonaspis) laportei* (Hawle & Corda) and *Acaste (Acastoides) paeckelmanni* R. & E. Richter. None of the species occurring in the Givetian were found by the writer in Wydryszów beds.

Stratigraphic and geographic distribution of the discussed species

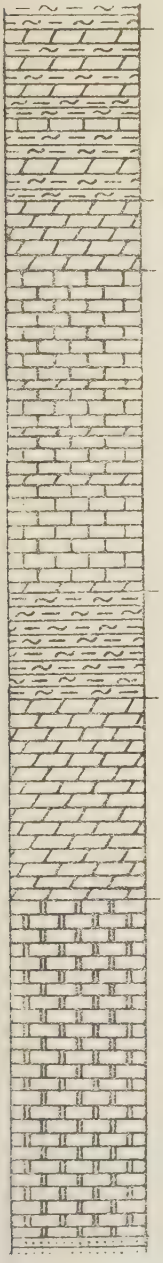
	Species	Lower Devonian	Couvinian
1	*Proetus (Proetus) papillaris* n. sp.		W
2	*Proetus (Proetus)* sp. *A.*		W, G?
3	*Proetus (Proetus) sp. B*		W
4	*Scharyia couviniana* n. sp.		W
5	*Cyrtosymbole?* sp.		W
6	*Otarion (Otarion) convexum* (Hawle & Corda)	Th	W, Cz
7	*Otarion (Otarion) polonicum praecedens* Kielan		W, G
8	*Leonaspis (Leonaspis) laportei* (Hawle & Corda)	H, Cz	W, Cz
9	*Scutellum (Scutellum)* sp.		W
10	*Scutellum (Paralejurus) dormitzeri dormitzeri* (Barr.)		W, G?, Cz
11	*Phacops (Phacops) latifrons grzegorzowicensis* Kielan		W, G
12	*Acaste (Acastoides) paeckelmanni* R. & E. Richter	T	W
13	*Asteropyge (Rhenops) jani* n. sp.		W

Legend

Species recorded from:

Cz — Czechoslovakia
H — Harz
W — Wydryszów (Holy Cross Mts.)
G — Grzegorzowice (Holy Cross Mts.)
Th — Thuringia
T — Turkey

A characteristic of beds in the Couvinian section from Wydryszów

Stratigr. column	Bed	Thickness in m	Type of rock	Trilobitic fauna
	8	?	mudstones	*Proetus (Proetus) papillaris, Phacops (Phacops) latifrons grzegorzowicensis*
	7	12.5	marls and mudstones	*Ph. (Ph.) latifrons grzegorzowicensis, Acaste (Acastoides) paeckelmanni, Pr. (Pr.) papillaris, Cyrtosymbole?* sp., *Otarion (Otarion) polonicum praecedens, Leonaspis (Leonaspis) laportei, Scutellum (Paralejurus) dormitzeri dormitzeri*
	6	5.0	marls	*Pr. (Pr.) papillaris, L. (L.) laportei, Ph. (Ph.) latifrons grzegorzowicensis, O. (O.) polonicum praecedens*
	5	23.5	limestones with marls inclusions	*Pr. (Pr.)* sp. *A, (Pr.)* sp. *B, Pr. (Pr.) papillaris, Scharyia cuviniana, O. (O.) convexum, O. (O.) polonicum praecedens, Sc. (Sc.)* sp., *Ph. (Ph.) latifrons grzegorzowicensis, Ac. (Acastoides) paeckelmanni, Asteropyge (Rhenops) jani*
	4	8.0	mudstones	*Ph. (Ph.) latifrons grzegorzowicensis, Ac. (Acastoides) paeckelmanni, Asteropyge (Rh.) jani*
	3	15.0	marls	*Ph. (Ph.) latifrons grzegorzowicensis, O. (O.) convexum.*
	2	24.5	dolomites	No Trilobites
	1	?	sandstones	ditto

In her paper on Lower Devonian Trilobites from the Grzegorzowice-Skały section Z. Kielan (1954) listed from the Couvinian the following Trilobites: *Dechenella (Basidechenella) kayseri* R. Richter, *Dechenella (Basidechenella) dombrowiensis* (Sobolew), *Otarion (Otarion) poloniçum praecedens* Kielan, *Acanthaloma (Kettneraspis)* sp. (= *Leonaspis (Kettneraspis)* sp.), *Scutellum (Paralejurus) dormitzeri* cf. *dormitzeri* (Barr.), *Phacops (Phacops) latifrons grzegorzowicensis* Kielan. Three only of these species have been found by the present writer in deposits of the same stage in Wydryszów, i. e. *Otarion (Otarion) polonicum praecedens* Kielan, *Scutellum (Paralejurus) dormitzeri dormitzeri* (Barr.) and *Phacops (Phacops) latifrons grzegorzowicensis* Kielan. The latter form, as is the case also in Grzegorzowice, occurs nearly throughout the Couvinian section of Wydryszów, regardless of the petrographic character of deposits.

In comparison to the trilobite fauna described by Kielan (1954) the trilobitic assemblage from Wydryszów here discussed, though by far less numerous is more strongly differentiated. The calcite-marly Couvinian deposits of Grzegorzowice and Wydryszów, after Czarnocki (1950), display great resemblance and are referable to the same facial area.

The important differences, however, observed in the trilobitic faunas recorded from these two sections not more than 10 km apart, suggest that they do not correspond to the same horizon. Lack of adequate material is in the way of determining which of the mentioned horizons is referable to the older Couvinian.

SYSTEMATIC DESCRIPTIONS[1]

Family **Proetidae** Hawle & Corda, 1847
Subfamily **Proetinae** (Hawle & Corda), 1847
Genus *Proetus* Steininger, 1831
Subgenus *Proetus (Proetus)* Steininger, 1831

Proetus (Proetus) papillaris n. sp.

(fig. 1; pl. I, fig. 1-3)

Holotype: cranidium figured in pl. I, fig. 1.

Stratum typicum: Couvinian mudstones (bed No. 7).

Locus typicus: Wydryszów, Holy Cross Mts., Poland.

Derivatio nominis: papillaris — arrangement of glabellar granules resembling the course of papillar lines on finger tip.

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[1] In description of glabella the present writer has followed the terminology used by V. Jaanusson (1956), i. e. lateral glabellar furrows and lobes are lettered S (sulcus) and L (lobus) respectively and are numbered from behind forwards. Independently of that the terminology followed by R. & E. Richter, i. e. posterior, median and anterior furrows and lobes, is also mentioned.

The abbreviations used are: tr. = transverse, i. e. perpendicular to the plane of symmetry; sag. = sagittal, i. e. parallel to plane of symmetry.

Glabellar length measured without occipital ring.

Material. — 14 cranidia, 8 free cheeks with spines broken off 10 pygidia (beds Nos. 5-8).

Dimensions of four specimens (in mm):

	1	*2*		*3*	*4*
Length of cephalon	7.8	4.2	Length of pygidium	5.2	3.0
Length of glabella	7.0	3.8	Width of pygidium	8.0	4.0
Width of glabella	5.0	2.9	Length of rachis	4.0	2.2
			Width of rachis	3.0	1.7

Diagnosis. — Glabella cylindrical; preglabellar field lacking; three lateral glabellar furrows as areas without granulation; basal furrow (S_1) occupies one fourth of maximum glabellar width, bifurcated at inner end and directed obliquely posteriorly; middle furrow (S_2) shorter, also directed obliquely posteriorly; anterior furrow (S_3) the shortest, not extending to dorsal furrow, directed slightly anteriorly; occipital ring

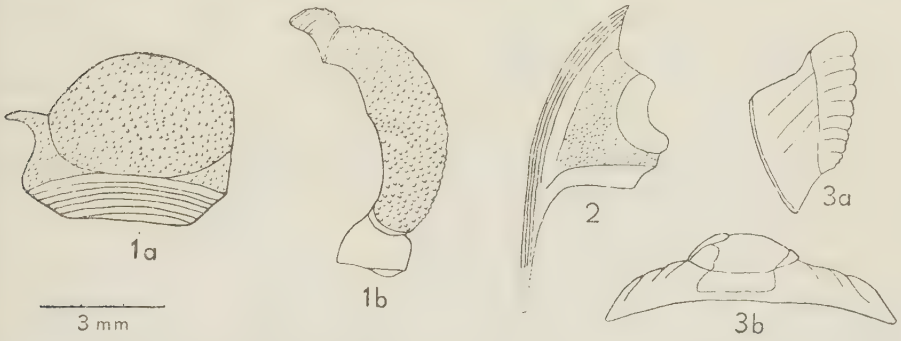

Fig. 1. — *Proetus (Proetus) papillaris* n. sp.; *1 a* paratype, cranidium, anterior view; *1 b* same specimen, lateral view; *2* paratype, free cheek, dorsal view; *3 a* paratype, pygidium, lateral view, *3 b* same specimen, posterior view.

with a tubercle; length of genal spine equal to two thirds of that of free cheek; pygidium surrounded by flat border with width equal to one sixth of total length of pygidium; cephalon finely granulated, glabellar granules arranged along the concentric lines; pygidium smooth.

Description. — Cranidium broadly rounded in front. Glabella cylindrical, broad, rounded in front; width/length from 0.7 to 0.8; dorsal furrows nearly parallel; lateral furrows broad in form of shallow depressions without granulation; posterior furrow (S_1) the longest, directed obliquely posteriorly and bifurcated at inner end, occupies about one fourth of the maximum glabellar width; middle furrow (S_2) shorter, also directed posteriorly; anterior furrow (S_3) as an oval depression placed somewhat obliquely anteriorly; occipital furrow deep and broad (sag.), bent forwards; occipital ring broad (sag.) with a central tubercle near its posterior

margin; palpebral lobes narrow, with maximum width (tr.) equal to one sixth of that of glabella measured in projection; facets on visual lobe not discernible even under strong magnification; border of cephalon with from 4 to 5 longitudinal concentric ridges; anterior border separated from the glabella by deep border furrow growing more shallow posteriorly and less deep at posterior genal angle; genal spine, preserverd as an imprint, has a length equal to two thirds or less than that of the free cheek; border ridges extending on the genal spines. In longitudinal section the occipital ring low, flat, the occipital furrow deep and broad (sag.); glabella low-convex, the border in front of glabella prominent. In transverse section glabella strongly convex, palpebral lobes extending to half the glabellar height. Hypostome and thorax unknown.

Pygidium sub-semicircular; length/width 0.7; width of rachis about one third of total width, its length equal to four fifths of total pygidial length; dorsal furrows divergent forwards and fusing backwards by a gentle arch. Rachis with 8 rings, and 5 ribs discernible on side lobes. The deep interpleural grooves and the shallow pleural furrows do not extend to pygidial borders; pygidium surrounded by flat border with width equal to one sixth of its length; border not separated from rest of pygidium by border furrow. In longitudinal and transverse sections rachis slightly higher than the pleural region. Cephalon finely granulated; glabellar granules arranged on lines resembling the arrangement of papillar lines on finger tip. They are largest in posterior end of glabella and diminish anteriorly. With a cephalic length of 7.8 mm, the diameter of tubercles is from 0.07 to 0.15 mm. On palpebral lobes and on the border zone the tubercles are very minute, being discernible under a magnification of × 60. On the remaining parts of the cephalon the tubercles are 0.07 mm in diameter. Round the eye lobe there is a narrow area without granulation. Pygidium smooth.

Remarks. — The here described species shows close similarity with *Proetus (Pr.) bohemicus* Hawle & Corda, from which it, however, differs in the presence of longer genal spines, a bifurcated posterior glabellar furrow (S_1) and a flat pygidial border. On the other hand, *Proetus (Pr.) papillaris* n. sp. is very near to *Pr. (Pr.) glandiferus* Novak, 1890. In the latter, however, the glabella is of considerably more slender form and without lateral furrows. In addition, the very peculiar ornamentation of glabella constitutes a feature by which *Pr. (Pr.) papillaris* n. sp. differs from all known species of subgenus *Pr. (Pr.)*. A. Přibyl (1946) and H. K. Erben (1951) have distinguished three groups within subgenus *Proetus (Proetus)* Stein., i. e.:

1. *Pr. (Pr.) bohemicus* Hawle & Corda, including species with broad glabella and a sharp genal angles.

2. *Pr. (Pr.) tenuimargo* R. Richter, including species with narrow glabella and long genal cheeks.

3. *Pr. (Pr.) orbitatus* Barr., including species with rounded genal angle.

Pr. (Pr.) papillaris n. sp. is not referable to any of these groups since it has a wide glabella typical of *Pr. (Pr.) bohemicus* Hawle & Corda, but free cheeks with fairly long spines, as is the case in *Pr. (Pr.) tenuimargo* Richter. Kielan (1954) in her observations on *Pr. (Pr.) granulosus* Goldfuss and *Pr. (Pr.) moravicus* Smyčka has noted that the subdivision suggested by Přibyl (1946) and Erben (1951) does not cover all species of subgenus *Pr. (Pr.)* Stein., and cannot be applied in the case of Polish species displaying characters intermediate between the several groups. Observations concerning *Pr. (Pr.) papillaris* n. sp. supply additional evidence of that fact.

Proetus (Proetus) sp. *A*

(pl. I, fig. 4)

Material. — A complete but distorted specimen from bed No. 5.

Dimensions (in mm):

Length of cephalon	9.5	Length of pygidium	6.0
Width of cephalon	17.0	Width of pygidium	9.1
Length of glabella	7.5	Length of rachis	5.0
Width of glabella	6.0	Width of rachis	3.5

Description. — Border slightly protruding in front of glabella; glabella elongate, with semicircular anterior outline and contiguous with border furrow; palpebral lobes broad (tr.), somewhat shifted to the back beyond the middle of glabellar length. The ridge surrounding the eye lobe slightly marked and posterior genal angle slightly pointed; rachis of thorax semicircular in transverse section, and elevated above the rather strongly convex side lobes; pleural edges rounded and directed forwards; pygidium sub-semicircular in outline; rachis U-shaped, occupying just a little more than one third of pygidial width; segmentation of rachis distinct (8 rings) but almost obliterated in pleural regions. In longitudinal section rachis slightly elevated above the side lobes and lowering gently backwards. In transverse section the semicircularly arched rachis is slightly elevated above the low-convex pleural region. Glabellar ornamentation consists of minute closely arranged granules, diminishing to the front, while the rest of the cephalon is without granulation; thorax and pygidium smooth.

Remarks. — From the Givetian of Grzegorzowice-Skały Kielan (1954, p. 8) has described species *Proetus (Proetus) granulosus* Goldfuss. Her

specimens were collected from beds *j* and l_2. Those recovered from bed *j* (pl. 1, fig. 3 of that author) differed from others in a distinctly elongate glabella, finer granulation and narrower (tr.) palpebral lobes, placed in median glabellar length. On the other hand, palpebral lobes of specimens from bed l_2 (pl. 1, fig. 1, 2, 4, 5) are placed somewhat posteriorly, beyond the median glabellar length. For that reason, R. & E. Richter (1956, p. 371) have suggested that these are two separate species.

The specimen collected from Wydryszów has an elongate and finely granulated glabella, as also have the specimens from bed *j* of the Grzegorzowice-Skały section, but its palpebral lobes are broad (tr.) and placed in the same relation to the glabella as has been observed in specimens from bed l_2. Pygidium comes very close to that in specimens from bed *j*.

R. & E. Richter (1956) have also questioned the specific identity of Polish specimens from bed l_2 of the Grzegorzowice-Skały section with typical *Proetus (Proetus) granulosus* (according to these authors conspecific with *Pr. (Pr.) cuvieri* Stein), from which it differs in a more distinctly quadrangular glabella, coarser granulation and in the anterior border not protruding in front of glabella.

These remarks are correct as regards the specimen figured by Kielan (1954) in pl. 1, fig. 5 a - 5 c, which corresponds to an extreme variety, whereas other specimens from bed l_2 (1954, pl. 1, fig. 1, 1 a, 2) differ from *Pr. (Pr.) granulosus* Goldfuss from the Eifel chiefly in slightly coarser granulation.

Differences in outline of glabella and of its relation to the anterior border in specimens from bed l_2 may be referred to individual variations, whereas some differences displayed by Polish and German specimens may indicate that these forms represent separate geographic stocks of the same species. Ampler material is needed for a final elucidation of this problem.

Proetus (Proetus) sp. *B*

(pl. I, fig. 5)

Material. — A nearly complete specimen, but lacking free cheeks; bed No. 5.

Dimensions (in mm):

Length of cephalon	4.2	Length of pygidium	2.1
Length of glabella	3.0	Width of pygidium	4.5
Width of glabella	2.8	Length of rachis	2.0
		Width of rachis	1.3

Description. — Anterior border broad (sag.), gently convex, with from 4 to 5 sharp ridges; border furrow deep; glabella cylindrical, slightly

enlarged posteriorly and gently rounded anteriorly, in direct contact with border furrow; width/length 0.9; two lateral furrows as non-granulated areas; glabella strongly convex both in transverse and longitudinal sections. Thorax with 10 segments; rachis gently tapering posteriorly and corresponding to one third of the total width of thorax; in transverse section rachis considerably more arched than the slightly convex side lobes. Pygidium semicircular with rachis tapering posteriorly and bluntly terminated, not extending to the outer margin; 8 rings discernible on rachis, interpleural grooves and pleural furrows faintly discernible. Glabella granulated, granules sharply pointed, anteriorly diminuating and more widely spaced; above border furrow glabella smooth; on the occipital ring the granules are more minute and widely spaced; fixed cheeks, pygidium and thorax smooth.

Remarks. — This form resembles *Proetus (Proetus) tenuimargo* R. Richter, 1909, recorded from the Givetian of Germany, in having a broad anterior border with several longitudinal ridges, but differs from it in having a less elongate glabella, broader (tr.) palpebral lobes, and in the glabellar granulation consisting of sharply pointed tubercles. This type of granulation occurs in *Proetus (Pr.) prox* R. & E. Richter, 1956, whose ovate glabella approaches very closely to that of the here discussed specimen. Nevertheless the two species show important differences, i. e. in *Proetus (Pr.)* sp. *B* the anterior border is not partly concealed under the glabella as is the case in *Proetus (Pr.) prox* R. & E. Richter, but, on the contrary, protrudes in front of the glabella, the palpebral lobes are broader (tr.), the glabella more strongly convex in transverse and longitudinal sections. The lack of free cheek in the Wydryszów specimen makes it impossible to ascertain whether the posterior genal angle is gently pointed, as it is in *Proetus (Pr.) prox* R. & E. Richter, or stretched out into a spine as in *Proetus (Pr.) tenuimargo* R. Richter.

Pygidia of the here studied species also show different proportions, i .e. length/width of pygidium in *Proetus (Pr.)* sp. 0.5, while it is 0.6 in *Proetus (Pr.) tenuimargo* R. Richter and 0.7 in *Proetus (Pr.) prox* R. & E. Richter.

Family **Cyrtosymbolidae** Hupé, 1953

Subfamily **Scharyiinae** n. subfam.

Trilobites with cephalon semicircular, glabella conical, preglabellar field wide (sag.), facial suture pseudoproparian [2], hypostome long and

[2] Also termed „*cedariiforme*". These are terms introduced by Hupé (1953) to designate a facial suture whose posterior branch is directed transversely to the longitudinal axis of the cephalon, as it is in the proparian type, and which bends backwards in its terminal course transecting the posterior border.

narrow, thorax with 6 segments, pygidium semicircular surrounded by a border, dorsal furrows V-shaped.

Occurrence. — Upper Silurian (Ludlow) — Middle Devonian (Couvinian), Czechoslovakia, Poland.

Discussion. — This subfamily is monotypic, being erected to include genus *Scharyia* Přibyl. This genus has by Přibyl (1946*b*, p. 25) been placed in subfamily Tropidocoryphinae Přibyl, family Proetidae (Hawle & Corda, 1847). P. Hupé (1953) placed it in subfamily Eodrevermanniinae Hupé, family Cyrtosymbolidae Hupé. Insomuch as the assignment of genus *Scharyia* Přibyl to Cyrtosymbolidae seems reasonable yet its association with such genera as *Prantlia* Přibyl, 1946, and *Eodrevermannia* Přibyl, 1946, in subfamily Eodrevermanniinae Hupé, seems doubtful. These genera have a typical opisthoparian facial suture and a greater number of thoracial segments, i. e. 8 in *Eodrevermannia*, 10 in *Prantlia*.

The pseudoproparian type of facial suture has been noted in representatives of Upper Cambrian families Pilgrimiidae Hupé, 1953, and Cedariidae Hupé, 1953. A facial suture unusual for the family of Proetidae, as well as the smaller number of segments in thorax, prompt the erection for *Scharyia* of a special subfamily — Scharyiinae n. subfam. in the family Cyrtosymbolidae Hupé.

Genus *Scharyia* Přibyl, 1946

Diagnosis and occurrence — as in the subfamily.

Type species *Scharyia micropyga* Přibyl, 1946.

Scharyia couviniana n. sp.

(fig. 2; pl. II, fig. 1, 2)

Holotype: cranidium, fig. 2-1 & pl. II, fig. 1.
Stratum typicum: Couvinian limestones and marls (bed No. 5).
Locus typicus: Wydryszów, Holy Cross Mts., Poland.
Derivatio nominis: couviniana — as occurring in Couvinian beds.

Material. — 10 cranidia, of which 7 preserved without exoskeleton, 1 damaged free cheek, 12 pygidia.

Dimensions of four specimens (in mm):

	1	*2*		*3*	*4*
Length of cephalon	2.5	1.8	Length of pygidium	2.6	1.8
Length of glabella	1.5	1.2	Width of pygidium	4.1	2.8
Width of glabella	1.5	1.2	Length of rachis	2.1	1.4
			Width of rachis	1.4	0.7

Diagnosis. — Length/width in glabella 1; two lateral glabellar furrows; occipital ring without tubercle; anterior and posterior branches of suture

sub-parallel; palpebral lobe separated from the fixed cheek by furrow; pygidium finely granulated.

Description. — Anterior part of cranidium flat, glabella conical, broadest at the base, length/maximum width 1; width (sag.) of occipital ring equal to one third of glabellar length; occipital furrow straight, shallow, deeper where transecting dorsal furrows; dorsal furrows deep at

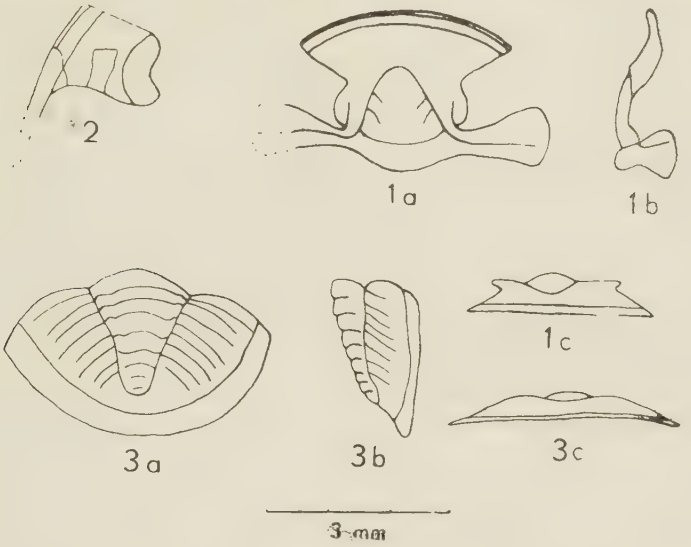

Fig. 2. — *Scharyia couviniana* n. sp.: *1 a* holotype, cranidium, dorsal view, *1 b* same specimen, lateral view; *1 c* same specimen, anterior view, *2* paratype, freek cheek, dorsal view; *3 a* paratype, pygidium, dorsal view; *3 b* same specimen, lateral view; *3 c* same specimen, posterior view.

the base of glabella near the occipital furrow, shallowing anteriorly and fusing together at an angle of approximately 52°. Two lateral glabellar furrows short and directed obliquely backwards. Owing to the deep incision of the dorsal furrow at the occipital ring, the hind part of the free cheek, between the dorsal furrow and the horizontal palpebral lobe, is steeply elevated. The palpebral lobe is separated from the fixed cheek by a deep furrow, deepest posteriorly, anteriorly growing more shallow to complete obliteration; the posterior part of the fixed cheek, back of the palpebral lobe, enlarged outwards; the posterior border furrow conspicuous, broad (sag.), horizontally directed; pleura of occipital segment enlarged at dorsal furrow; facial suture pseudoproparian, both its branches sub-parallel; eye lobe low-convex, with facets very minute, distinctly delimited, alternately arranged in 5 horizontal rows. A damaged free cheek, found detached, has the lateral border with a characteristic

ridge, also noted on the anterior border. Near the free cheek the impression is visible of a broken off genal spine, whose length cannot be determined. In the longitudinal section the occipital ring is low, the occipital furrow shallow and narrow (sag.), the glabella flat, the broad preglabellar field descends to the upturned anterior border which has a well marked sharp ridge. In transverse section glabella slightly convex, as high as or slightly higher than palpebral lobes. Hypostome and thorax unknown. Pygidium sub-semicircular, length/width 0.6; pygidial border convex, pygidial border furrow broad and moderately deep; rachis with 9 rings, pleurae with 4 discernible ribs. In longitudinal section rachis uniformly elevated, posteriorly it bends rapidly without attaining the border. In transverse section rachis slightly more raised than the convex side lobes; border strongly convex and distinctly separated from rest of pygidium.

Remarks. — The here described species, as compared with *Scharyia micropyga* Přibyl, 1946, the only species of the genus thus far described and occurring in the Upper Silurian and Lower Devonian of Czechoslovakia, displays numerous differences:

Scharyia micropyga Přibyl	*Scharyia couviniana* n. sp.
Anterior portion of cranidium narrow (tr.).	Anterior portion of cranidium broad (tr.).
Glabella with 3 lateral furrows.	Glabella with 2 lateral furrows.
Occipital ring with tubercle.	Lack of tubercle.
Anterior and posterior branch of facial suture non-parallel.	Both branches of suture sub-parallel.
Palpebral lobe not delimited from fixed cheek.	Palpebral lobe delimited by furrow from fixed cheek.
Pygidium smooth.	Pygidium finely granulated.

Přibyl has described and reconstructed *Scharyia micropyga* Přibyl in two of his papers (1946*a*, 1946*b*). The figures published in these papers differ considerably. In the first reconstruction (1946*a*, fig. 9) the posterior branch of facial suture intersects the posterior border in front of the genal angle, and there are 3 lateral furrows marked on the glabella. In the second reconstruction (1946 *b*, pl. 2, fig. 9) the posterior branch of suture intersects the genal angle and only 2 lateral furrows are marked on the glabella (though 3 are mentioned in the description). In our comparison, the second figure only has been considered.

Subfamily **Cyrtosymbolinae** Hupé, 1953
Genus *Cyrtosymbole?* R. Richter, 1913
Cyrtosymbole? sp.

(pl. III, fig. 3)

Material. — 1 cranidium (bed. No. 7).
Dimensions (in mm):

Length of cephalon	1.39	Width of glabella	0.61
Length of glabella	0.9	Width/length of glabella	0.6

Description. — Front of cranidium slightly rounded; occipital ring very broad (sag.), medially equal to one third of glabellar length, rapidly tapering at dorsal furrows; occipital furrow straight; dorsal furrow subparallel; glabella elongate, cylindrical, enlarged at basal glabellar lobes, gently rounded anteriorly; basal lateral furrows (S_1) well incised in the glabella and cutting off the basal lobes (L_1); preglabellar field broad (sag.), its width being equal to nearly one fourth of glabellar length; border furrow extremely shallow; anterior border broad (sag.), equal to one eighth of glabellar length; fixed cheeks broad (tr.); palpebral lobes semicircular, set somewhat posteriorly, beyond median glabellar length. In longitudinal section occipital ring very broad (sag.), flat; occipital furrow shallow; glabella somewhat higher than occipital ring, nearly flat in two thirds of its length, then rather steeply descending to the downturned preglabellar field; anterior border upturned. In transverse section the glabella strongly convex, palpebral lobes reach median glabellar height. Exoskeleton smooth. Free cheeks. Thorax and pygidium unknown.

Remarks. — The here described species seems to confirm Přibyl's (1949) belief concerning the connection of some Middle Devonian forms with the Upper Devonian genus *Cyrtosymbole* R. Richter, 1913. Přibyl (1949, p. 328) mentioned that *Proetus superstes* Barr., described by J. Barrande (1852, 1872) from the uppermost Middle Devonian (Hh_1) of Czechoslovakia, cannot be referred to genus *Proetus* Stein., its characters bringing it more closely to the Upper Devonian genus *Cyrtosymbole* R. Richter. These are among others: an elongate glabella and very large eyes, as well as outline of pygidium. Přibyl (1949) has also stressed the resemblance of *Proetus superstes* Barr. to *Cyrtosymbole (Waribole) phacomma* R. & E. Richter, 1926, in naming this form *Cyrtosymbole? superstes* (Barr.).

The above described species also displays features characteristic of genus *Cyrtosymbole,* particularly subgenus *Cyrtosymbole (Waribole)* R. & E. Richter. The Polish specimen, however, does not approach *C. (Waribole) phacomma* R. & E. Richter, whose glabella tapers slightly between

the anterior edges of the palpebral lobes, the central (S_2) and anterior (S_3) lateral furrows are well impressed, and the preglabellar field is narrower (sag.) than the anterior border. It resembles more *C. (Waribole) warsteinensis* R. & E. Richter, 1926 (see correlation table).

Correlation table of 1. *Cyrtosymbole (Waribole) warsteinensis* R. & E. Richter, 2. *Cyrtosymbole?* sp., and 3. *Cyrtosymbole? superstes* (Barr.) *

	1	2	3
Anterior outline of cranidium	nearly flat	nearly flat	highly arched
Width of occipital ring (sag.)	one fourth of glabellar length	one third of glabellar length	one fifth of glabellar length
Occipital ring	slightly tapering laterally	abruptly tapering	slightly tapering peripherally
Posterior (S_1) lateral glabellar furrows	deep, cutting off basal lobes	moderately deep, cutting off basal lobes	weakly impressed
Anterior outline of glabella	gently rounded	gently rounded	gently rounded
Width of preglabellar field	one eighth of glabellar length	one fourth of glabellar length	one twelfth of glabellar length
Width of anterior border	one tenth of glabellar length	one eighth of glabellar length	one sixth of glabellar length
Distance of terminal ends of palpebral lobes from glabella	small	great	very small
In longitudinal section	glabella flat	glabella convex	glabella flat
In transverse section	glabella slightly convex	glabella strongly convex	?
Shape of pygidium	slightly elongate posteriorly	unknown	slightly elongate posteriorly
Pygidial rachis	broad, occupying two thirds of pygidial length	—	narrow, nearly attaining posterior pygidial border

* The dimensions of *Cyrtosymbole (Waribole) warsteinensis* and *Cyrtosymbole? superstes*, listed in the table here below, have been taken from figures of these species.

Family **Otarionidae** R. & E. Richter, 1926

Subfamily **Otarioninae** R. & E. Richter, 1926

Genus *Otarion* Zenker, 1833 emend. R. & E. Richter, 1926

Subgenus *Otarion (Otarion)* Zenker, 1833 emend. R. & E. Richter, 1926

Otarion (Otarion) polonicum praecedens Kielan, 1954

(pl. III, fig. 5)

1954. *Otarion (Otarion) polonicum praecedens* Kielan; Z. Kielan, Les Trilobites mésodévoniens..., p. 26, pl. 2, fig. 10 et 11; text-fig. 18.

Material. — 2 damaged cephalons, 1 cranidium preserved as mould, one cheek. From marls (bed No. 5) and mudstones (bed No. 6).

Dimensions of two specimens (in mm):

	1	*2*		*1*	*2*
Length of cephalon	6.5	6.0	Length of glabella	4.5	4.2
Width of cephalon	9.5	9.0	Width of glabella	4.0	3.7
Length/width of cephalon	0.6	0.6	Width/length of glabella	0.8	0.8

Remarks. — The specimens found in Wydryszów generally agree with those described by Kielan (1954) from the Couvinian of Grzegorzowice. The only distinction is in the different shape of depression in the free cheek angle, which in specimens here described is elongate as in *O. (Otarion) polonicum polonicum* Kielan, 1954. *O. (Otarion) polonicum praecedens* displays close similarity to *O. (Otarion) balanops* Erben, 1953 from the Couvinian of Germany (Eifel), it differs, however, in another orientation of cheek spines in relation to the longitudinal axis, the genal spine in the former being sub-parallel to the longitudinal axis, while in the latter it is directed obliquely outwards.

Otarion (Otarion) convexum (Hawle & Corda), 1847

(fig. 3; pl. III, fig. 4)

1952. *Otarion (Otarion) convexum* (Hawle & Corda); H. K. Erben, Trilobiten aus dem Älteren Hercyn..., p. 246, pl. 19, fig. 15, text-fig. 28 (with previous synonymy).

Material. — 4 damaged cranidia preserved in marls (beds Nos. 2 and 4).

Dimensions of two specimens (in mm):

	1	*2*		*1*	*2*
Length of cephalon	4.9	4.0	Width of glabella	3.0	2.0
Length of glabella	3.9	2.9	Width/length of glabella	0.7	0.7

The Polish forms of this species do not differ from those of Czechoslovakia, described by Barrande (1852) and by Přibyl and Prantl (1950)

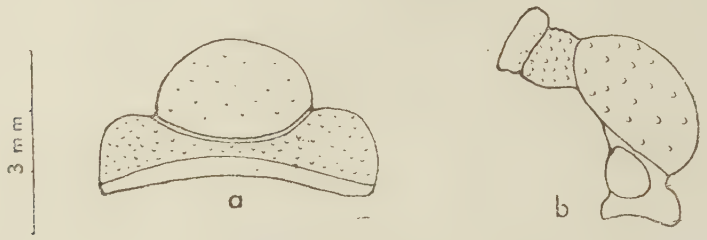

Fig. 3. — *Otarion (Otarion) convexum* (Hawle & Corda): *a* cranidium, anterior view; *b* same specimen, lateral view.

from lower Middle Devonian beds ($g\alpha_1$ and $g\alpha_2$) or from German forms, described by Kegel (1931) and Erben (1952) from Lower Devonian deposits.

Family **Scutellidae** R. & E. Richter, 1925

Genus *Scutellum* Push, 1833

Subgenus *Scutellum (Paralejurus)* Hawle & Corda, 1847

Scutellum (Paralejurus) dormitzeri dormitzeri (Barrande, 1852)

(pl. II, fig. 6)

1852. *Bronteus dormitzeri* Barr.; J. Barrande, Système silurien..., p. 847, pl. 48.

Material. — 1 cranidium, fragments of exoskeleton from marls (bed No. 7).

Dimensions (in mm):

length of cranidium	12
width of cranidium	14

Remarks. — The cranidium of *Sc. (Paralejurus) dormitzeri dormitzeri* Barr. collected from Wydryszów scarcely differs at all from *Sc. (Paralejurus) dormitzeri* cf. *dormitzeri* Barr., described by Kielan (1954) from the Couvinian of Grzegorzowice. Nevertheless the transverse and longitudinal sections of the cranidium are flatter, while the glabellar furrows are faintly impressed as is the case in Bohemian specimens. These features are not observed in cranidia from Grzegorzowice, which led Kielan to describe them as *Scutellum (Paralejurus) dormitzeri* cf. *dormitzeri* Barr. In preserved fragments of exoskeleton from Wydryszów ornamentation is the same as that in Bohemian specimens.

Subgenus *Scutellum (Scutellum)* Pusch, 1833

Scutellum (Scutellum) sp.

(pl. II, fig. 7)

Material. — 1 pygidium from limestones (bed No. 5).

Dimensions (in mm):

Width of pygidium	6.0	Length of rachis	2.0
Length of pygidium	8.5	Width of rachis	2.5

Description. — Pygidium sub-semicircular in outline; length/width 0.7; rachis convex, broadly triangular; on its surface are impressed two longitudinal parallel furrows reaching its end just at the summit of the triangle. These furrows divide the rachis into three longitudinal regions of which the median one is more convex than the two lateral; the pleural region of pygidium gently convex. All pleural ribs approximately of the same width, only the first and the middle ribs are broader, the first rib more convex than all others. Pleural furrows narrow (tr.) and gradually becoming obliterated towards rim of carapace which forms a flat border. In longitudinal section the rachis convex, the posterior area of pygidium flat, descending slightly beyond two thirds of length and again slightly raised peripherally. Several small granules on the axis; a single row of minute granules (about 0.1 mm in diameter) runs medianly along every rib; border smooth.

Remarks. — The here described pygidium approaches that in *Scutellum (Scutellum) flabelliferum* (Goldfuss). The existing differences, however, indicate that we are dealing with another species. The differences are: stronger convexity of pygidial exoskeleton, broad and very prominent first pygidial rib, characteristic ornamentation consisting of a single row of granules running medially along each rib, and longitudinal furrows on rachis not coalescing basally as is the case in *Sc. (Sc.) flabelliferum* (Goldfuss), but extending to rim of rachis near its summit.

Family **Odontopleuridae** Burmeister, 1843

Subfamily **Leonaspidinae** Prantl & Přibyl, 1949

Genus *Leonaspis* R. & E. Richter, 1917

Subgenus *Leonaspis (Leonaspis)* R. & E. Richter 1917

Leonaspis (Leonaspis) laportei (Hawle & Corda), 1847

(fig. 4; pl. III, fig. 8)

1952. *Acanthaloma (Acanthaloma) laportei* (Hawle & Corda); H. K. Erben, Trilobiten aus dem Älteren Hercyn..., p. 289, text-fig. 44a, b; pl. 20, fig. 11, 12 (with previous synonymy).

Material. — 3 cranidia preserved in marls (beds Nos. 6, 7).

Dimensions of three specimens (in mm):

	1	2	3
Length of cranidium	7.5	7.0	4.5
Width of cranidium	11.0	13.0	8.0

Description. — Anterior border damaged; anterior border furrow straight, directed transversely; central part of glabella cylindrical, frontally enlarged and T-shaped; false glabellar furrows parallel, running from occipital furrow to the anterior part of glabella, but not extending to anterior border furrow; dorsal furrows diverging posteriorly; occipital

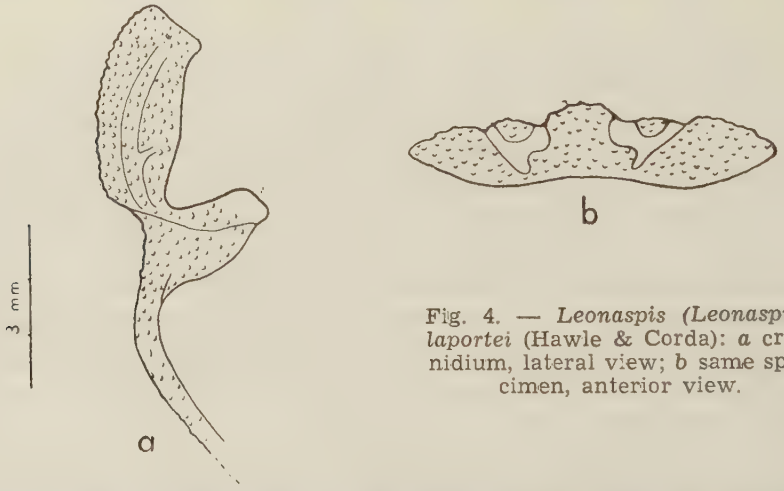

Fig. 4. — *Leonaspis (Leonaspis) laportei* (Hawle & Corda): *a* cranidium, lateral view; *b* same specimen, anterior view.

furrow arched toward the front; two of the lateral glabellar furrows (S_1 and S_2) directed obliquely backwards; lateral lobes (L_1 and L_2) oval shaped, the posterior one (L_1) larger than the median (L_2). The occipital ring tapered abruptly at the dorsal furrows, in the central portion provided with a long median spine; the fixed cheek bounded on the outside by a distinct furrow. Owing to unsatisfactory state of preservation, the eye ridge as well as the palpebral lobe are not discernible. In longitudinal section the occipital ring is broad (sag.), the occipital furrow extremely broad (sag.) and deep, the central part of glabella rises rather abruptly from occipital furrow and then descends gently to the anterior border furrow. In transverse section the cranidium is faintly convex, the central part of the glabella being gently convex, the lateral lobes as high as the glabella, and the dorsal furrows and false glabellar furrows extremely broad (tr.) and moderately deeply incised. Surface of glabella, fixed cheeks and occipital spine granulated.

Remarks. — Specimens of *Leonaspis (Leonaspis) laportei* (Hawle & Corda), described by Hawle and Corda (1947) and by Barrande (1852) from Lower Devonian and lower part of the Middle Devonian ($f\beta_1$ and $g\alpha_2$)

of Czechoslovakia, as well as by Kegel (1926) and Erben (1952) from the Lower Devonian of Germany, are doubtlessly all conspecific. Nevertheless, specimens here described display different cranidial proportions. While cranidia in Bohemian and German specimens are approximately as long as they are wide, the Wydryszów specimens have the cranidium about twice as broad as they are long. Their characteristic unpaired occipital spine has, thus far, been described and figured in papers by Kegel (1926) and Hawle and Corda (1847). A photograph of the same specimen has been published by Prantl and Přibyl (1949). In both these cases, however, the spine is broken off just beyond the occipital ring. It seems that the spine in specimens here described was more slender. The cited authors make no mention of the strong inflection of the spines (see fig. 4 *a*), which is a very characteristic feature of the Polish specimens.

Subfamily **Acastinae** Delo, 1935

Genus *Acaste* Goldfuss, 1843

Subgenus *Acaste (Acastoides)* Delo, 1935

Acaste (Acastoides) paeckelmanni R. & E. Richter, 1939

(fig. 5; pl. II, fig. 3-5)

1939. *Acaste (Acastoides) paeckelmanni* R. & E. Richter; R. & E. Richter, Trilobiten aus dem Bosporus..., p. 23, pl. 18, fig. 19-21.

Material. — 17 cephalons, of which 9 as internal moulds, 5 pygidia. From marls (bed No. 5) and mudstones (bed No. 4).

Dimensions of four specimens (in mm):

	1	*2*	*3*	*4*
Length of cephalon	6.0	4.1	—	—
With of cephalon	10.2	7.0	—	—
Length of glabella	5.7	4.0	—	—
Wirdth of glabella	4.9	3.0	—	—
Ratio of distance of eye from posterior cephalon rim to length of eye and to distance of eye from anterior cephalon rim	1:2:1.5	1:2:1.5	—	—
Length of pygidium	—	—	—	4.0
Width of pygidium	—	—	—	4.2

Description. — Cephalon semicircular in outline, length/width 0.6; dorsal furrows deep, extending sub-parallel as far as the anterior lateral furrow (S_3), and then slightly deflected outwards. Occipital furrow somewhat bent forwards, strongly deeper at intersection with dorsal furrows; pre-occipital furrow (S_1) the deepest, directed somewhat forwards; the median furrow (S_2) horizontal, the anterior (S_3) bent backwards; border

in front of the glabella very narrow, widening laterally; border furrow very faintly impressed; posterior border dilates laterally. Posterior border furrow well incised near the dorsal furrows, but disappearing near the rounded posterior genal angle; eyes large; palpebral lobe delimited from fixed cheek by a short furrow inflected to the outside; on the eye lobe three horizontal rows of round lenses, distinctly spaced. Anterior branches of the facial suture coalesce in the border furrow anteriorly to the glabella; posterior branches directed outwards. In longitudinal section the occipital ring not higher than the glabella, occipital furrow faintly incised, glabella gently arched, border furrow weakly marked, anterior

Fig. 5. — *Acaste (Acastoides) paeckelmanni* R. & E. Richter: *a* pygidium, lateral view; *b* same specimen, posterior view.

border narrow (sag.), gently convex. In transverse section glabella slightly convex, palpebral lobes horizontally placed in the glabellar plane, eye lobe placed vertically in relation to the palpebral one and separated from the cheek by a distinct furrow. The cheek descends nearly vertically, its angle with the horizontal plane decreases only by the lateral border; thorax unknown. Pygidium semicircular; rachis with 6 rings separated by furrows which, the first one excepted, become shallow medially; 4 ribs on the sides lobes; interpleural grooves narrow (sag.). On the first half-rib a broad (sag.) articulate surface is well discernible. In longitudinal section the rachis gently passes into the posterior part of pygidium. In transverse section the rachis scarcely raised above the side lobes, dorsal furrows not impressed. Glabella covered by granules about 0.07 mm in diameter, the length of cephalon being 6 mm; occipital ring smooth; in free cheek ornamentation is of a denser and more delicate pattern; pygidium smooth, some tubercles present along its posterior edge only.

Remarks. — Among the 17 studied cephalons, 4 are distinguished by the course of its median latered furrow (S_2) which is interrupted before attaining the dorsal furrow. In one specimen this furrow extends to the dorsal furrow, but it is very shallow. In consequence, the above specimen

occupies an intermediate position between two groups. Since cephalons with the lateral furrow S_2 not extending to the dorsal furrow, are on the average smaller than those of typical specimens, it may be that they are juvenile forms. Polish forms are not distinct from the holotype described by R. & E. Richter (1939) from the Upper Coblenzian of Turkey. Only the number of rows of facets on the eye lobe in here described specimens is smaller, never exceeding 3, and twice being 2 only. The forms from Turkey have from 4 to 5 rows. In specimens described by R. & E. Richter (1939) the middle lateral furrow (S_2) always stretches to the dorsal furrows.

Family **Phacopidae** Hawle & Corda, 1847 emend. Delo, 1935
Subfamily **Phacopinae** Reed, 1905
Genus *Phacops* Emmrich, 1839
Subgenus *Phacops (Phacops)* Emmrich, 1839
Phacops (Phacops) latifrons grzegorzowicensis Kielan, 1954

(pl. III, fig. 1, 2)

1954. *Phacops (Phacops) latifrons grzegorzowicensis;* Z. Kielan, Les Trilobites mésodévoniens..., p. 36, pl. 7, fig. 1-5; text-fig. 29, 30.

Material. — 14 cephalons, 10 of which as internal moulds, 2 pygidia (beds Nos. 3-8).

Dimensions of four specimens (in mm):

	1	*2*		*1*	*2*
Length of cephalon	12.0	7.8	Length of pygidium	10.0	12.0
Width of cephalon	20.0	11.0	Width of pygidium	18.0	17.0
Length of glabella	10.0	6.2	Length of rachis	7.0	10.0
Width of glabella	13.0	8.0	Width of rachis	4.0	5.5

Remarks. — Z. Kielan has described the above mentioned subspecies from Couvinian marly shales of Grzegorzowice-Skały. It is relatively abundant in the Couvinian of Wydryszów and occurs virtually throughout the whole profile. Wydryszów specimens compared with those from Grzegorzowice are on the average smaller and provided with fewer facets on the eye lobe, i. e. three in each of the 15 vertical rows. In longitudinal section the occipital ring is not flat as it is in specimens from Grzegorzowice, but strongly convex. This feature brings the here discussed specimens nearer to *Phacops (Phacops) latifrons* (Bronn.) from Germany. On the other hand, the glabella slightly overhangs the anterior border, like in specimens from Grzegorzowice.

Family **Dalmanitidae** Delo, 1935
Subfamily **Asteropyginae** Delo, 1935
Genus *Asteropyge* Hawle & Corda, 1847
Subgenus *Asteropyge (Rhenops)* R. & E. Richter, 1943

Asteropyge (Rhenops) jani n. sp.

(fig. 6; pl. III, fig. 6, 7)

Holotype: cephalon (fig. 6; pl. II, fig. 6).
Stratum typicum: Couvinian marls (bed No. 5).
Locus typicus: Wydryszów, Holy Cross Mts., Poland.
Derivatio nominis: jani — after the name of Jan Czarnocki, an outstanding Polish geologist.

Material. — 3 cephalons, 1 cranidium, 2 free cheeks, all specimens with exoskeleton preserved.

Diagnosis. — Glabella gently convex, eyes high; free cheeks steeply descending, genal spines with length one half that of cephalon, occipital ring with prominent tubercle.

Dimensions (in mm):

Length of cephalon	4.3	Width of glabella	3.4
Width of cephalon	6.8	Length of eye	1.8
Length of glabella	3.9	Height of eye	1.1

Description. — Cephalon high arched in outline, length/width 0.6; anterior border narrow (sag.); facial suture, running anteriorly parallel to the outline of frontal lobe, divides the anterior border into 2 bands of almost the same width; border furrow lacking; dorsal furrow but slightly divergent to the anterior lateral furrow (S_3), but more strongly deflected outwards by the frontal lobe; occipital ring moderately broad (sag.), convex, with a distinctly prominent median tubercle; occipital furrow straight, deep; lateral glabellar furrows uniformly impressed; posterior lateral furrow (S_1) straight, parallel to the occipital furrow; median furrow (S_2) directed obliquely anteriorly; anterior furrow (S_3) the longest, directed obliquely backwards. Owing to this course of the median (S_2) and anterior (S_3) furrows, the third lateral lobe (L_3) enlarged distinctly at the dorsal furrows; posterior border furrow distinct from dorsal furrows to the cheek spine where it vanishes abruptly. Part of the fixed cheek contained between the dorsal furrow and the palpebral lobe is steeply elevated; palpebral furrow deep; eyes large with anterior ends close to the dorsal furrows at the level of the third lateral furrow (S_3), there is considerable space between their posterior ends and the dorsal furrows. At the outer margin of the palpebral lobe a shallow furrow runs parallel to its edge; on the visual surface lenses arranged alternately in 5 horizontal rows; visual lobe delimited at the base by a flat ridge, separated by a furrow

from the free cheek. Genal spine broad, flat, with length (sag.) half that of the cephalon; spine without longitudinal furrow. In longitudinal section occipital ring convex with strong occipital tubercle, occipital furrow deep, glabella flat, passing anteriorly as a continuous line into the narrow

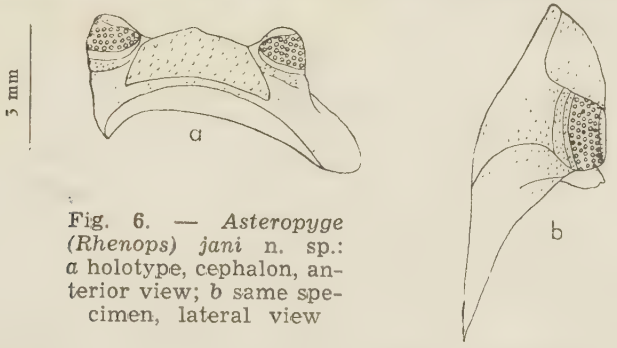

Fig. 6. — *Asteropyge (Rhenops) jani* n. sp.: *a* holotype, cephalon, anterior view; *b* same specimen, lateral view

anterior border. In transverse section glabella slightly convex, eyes conspicuously raised above the glabella, eye lobe placed vertically in relation to the palpebral lobe and separated by a furrow from the free cheek which steeply extends downwards. Glabella covered with densely and evenly spaced granules, 0.1 mm, with length of cephalon at 4.3 mm; on occipital ring the granulation indistinct, on the cheeks smaller granules, decreasing in size and growing more sparse towards the cephalic border. Thorax and pygidium unknown.

Remarks. — The new species here discussed displays characters of subgenus *Asteropyge (Rhenops)* R. & E. Richter, 1943. In the development of the glabella this species very closely resembles *Asteropyge (Rhenops) anserina* R. & E. Richter, 1916, from the Lower Coblenzian of Germany

Asteropyge (Rhenops) anserina	*Asteropyge (Rhenops) jani* n. sp.
Middle lateral furrow (S_2) arcuate, horizontal.	Middle lateral furrow, straight, directed obliquely forwards.
No tubercle on occipital ring.	Strong tubercle on occipital ring.
Eyes not higher than glabella.	Eyes higher than glabella.
No furrow near the outer edge of palpebral lobe.	Distinct furrow near the outer edge of palpebral lobe.
Genal spine slightly longer than one third the cephalic length.	Genal spine half as long as the cephalon.
Genal spine divided into two parts by a longitudinal furrow.	Genal spine without a longitudinal furrow.

(Eifel) (*idem*, 1943). On the existing differences, however, these two species can be reasonably separated. These differences are illustrated by table on preceding page.

Paleozoological Laboratory
of the Polish Academy of Sciences
Warszawa, October 1956

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HALSZKA OSMÓLSKA

TRYLOBITY KUWINU Z WYDRYSZOWA (GÓRY ŚWIĘTOKRZYSKIE)

Streszczenie

Autorka opisała trylobity znalezione w osadach kuwinu miejscowości Wydryszów. Występują tam trzy gatunki znane z kuwinu profilu Grzegorzowice-Skały (Góry Świętokrzyskie):

Otarion (Otarion) polonicum praecedens Kielan
Phacops (Phacops) latifrons grzegorzowicensis Kielan
Scutellum (Paralejurus) dormitzeri dormitzeri (Barrande),

a także dotychczas w Polsce nie znajdowane:

Otarion (Ctarion) convexum (Hawle & Corda)
Leonaspis (Leonaspis) laportei (Hawle & Corda)
Acaste (Acastoides) paeckelmanni R. & E. Richter.

Do tego dochodzą trzy nowe gatunki:

Proetus (Proetus) papillaris n. sp.
Scharyia couviniana n. sp.
Asteropyge (Rhenops) jani n. sp.

Ustanowiona tu została podrodzina Scharyiinae n. subfam.

Poniżej przytoczone są krótkie diagnozy gatunków nowych:

Proetus (Proetus) papillaris n. sp.

(fig. 1; pl. I, fig. 1-3)

Glabella walcowata; pola preglabelarnego brak; na glabelli trzy bruzdy boczne w postaci pól bez granulacji; na pierścieniu potylicznym guzek; długość kolca policzkowego równa 2/3 długości policzka ruchomego; pygidium otoczone płaską obwódką, szerokości równej 1/6 całkowitej długości tarczy pygidialnej; cefalon pokryty drobną granulacją; guzki na glabelli ułożone wzdłuż linii przypominających przebieg linii papilarnych na opuszce palca; pygidium gładkie.

Scharyia couviniana n. sp.

(fig. 2; pl. II, fig. 1, 2)

Stosunek długości do szerokości glabelli równy 1; na glabelli 2 bruzdy boczne; pierścień potyliczny bez guzka; szew twarzowy pseudoproparilny, jego przednia i tylna gałąź niemal równoległe, płat powiekowy odgraniczony od policzka stałego bruzdą; pygidium otoczone limbusem, delikatnie granulowane.

Asteropyge (Rhenops) jani n. sp.

(fig. 6; pl. III, fig. 6, 7)

Glabella słabo uwypuklona; oczy wysokie; policzki stromo opadające ku dołowi; kolce policzkowe o długości równej 1/2 długości cefalonu; pierścień potyliczny z wydatnym guzkiem; toraks i pygidium nie znane.

OBJAŚNIENIA DO ILUSTRACJI

Fig. 1 (p. 57)

Proetus (Proetus) papillaris n. sp.: *1 a* paratyp, kranidium z przodu; *1 b* ten sam okaz, z boku; *2* paratyp, policzek ruchomy, z góry; *3 a* paratyp, pygidium, z boku; *3 b* ten sam okaz, z tyłu.

Fig. 2 (p. 63)

Scharyia couviniana n. sp.: *1 a* holotyp, kranidium, z góry; *1 b* ten sam okaz, z boku; *1 c* ten sam okaz, z przodu; *2* paratyp, policzek ruchomy, z góry; *3 a* paratyp, pygidium, z góry; *3 b* ten sam okaz, z boku; *3 c* ten sam okaz, z tyłu.

Fig. 3 (p. 68)

Otarion (Otarion) convexum (Hawle & Corda): *a* kranidium, z boku; *b* ten sam okaz, z przodu.

Fig. 4 (p. 70)

Leonaspis (Leonaspis) laportei (Hawle & Corda): *a* kranidium, z boku; *b* ten sam okaz, z przodu.

Fig. 5 (p. 72)

Acaste (Acastoides) paeckelmanni R. & E. Richter: *a* pygidium, z boku; *b* ten sam okaz, z tyłu.

Fig. 6 (p. 75)

Asteropyge (Rhenops) jani n. sp.: *a* holotyp, cefalon, z przodu; *b* ten sam okaz, z boku.

Pl. I

Proetus (Proetus) papillaris n. sp.

Fig. 1. Holotyp, kranidium, w. 6; × 5.
Fig. 2. Paratyp, pygidium, w. 6; × 5.
Fig. 3. Paratyp, kranidium, dobrze widoczna ornamentacja, w. 6; × 4.8.

Proetus (Proetus) sp. *A*

Fig. 4 *a*, *b*. Cały okaz w dwóch pozycjach, w . 5; × 2,6.

Proetus (Proetus) sp. *B*

Fig. 5*a*. Kranidium, w. 5; × 5,7.
Fig. 5*b*. Ten sam okaz, widoczny toraks i pygidium; × 6,4.

Pl. II

Scharyia couviniana n. sp.

Fig. 1. Holotyp, kranidium, w. 5; × 8,5.
Fig. 2. Paratyp, pygidium, w. 5; × 7,2.

Acaste (Acastoides) paeckelmanni R. & E. Richter

Fig. 3. Cefalon ze środkową bruzdą boczną (S_2) nie dochodzącą do bruzd grzbietowych, w. 4; × 5.
Fig. 4*a*. Cefalon ze środkową bruzdą boczną (S_2) dochodzącą do bruzd grzbietowych, w. 4; × 4,5.
Fig. 4*b*. Ten sam okaz, widok z boku; × 4.5.
Fig. 5. Pygidium, w. 5; × 5.

Scutellum (Paralejurus) dormitzeri dormitzeri Barrande

Fig. 6. Kranidium, w. 7; × 3.2.

Scutellum (Scutellum) sp.

Fig. 7. Pygidium, w. 5; × 5,1.

Pl. III

Phacops (Phacops) latifrons grzegorzowicensis Kielan

Fig. 1. Cefalon i fragment toraksu, w. 6; wielk. nat.

Fig. 2. Cefalon, ośródka, w. 3; × 5.

Cyrtosymbole? sp.

Fig. 3. Kranidium, w. 7; × 19.4.

Otarion (Otarion) convexum (Hawle & Corda)

Fig. 4. Kranidium, w. 5; × 5.5.

Otarion (Otarion) polonicum praecedens Kielan

Fig. 5. Cefalon, w. 5; × 5.

Asteropyge (Rhenops) jani n. sp.

Fig. 6. Holotyp, cefalon, w. 5; × 6.7.

Fig. 7. Płat wzrokowy, w. 5; × 6.2.

Leonaspis (Leonaspis) laportei (Hawle & Corda)

Fig. 8. Kranidium, w. 6; × 5,1.

ГАЛЬШКА ОСМУЛЬСКА

ТРИЛОБИТЫ КУВИНА ИЗ ВЫДРЫШОВА (СВЕНТОКРЖИСКИЕ ГОРЫ), ПОЛЬША

Резюме

В данной заметке описаны кувинские трилобиты из местности Выдрышув в Свентокржиских Горах. Некоторые виды были уже описаны Келин (Z. Kielan, 1954) из разреза Гржегоржовице-Скалы в тех же Свентокржиских Горах. Это следующие виды:

Otarion (Otarion) polonicum praecedens Kielan

Phacops (Phacops) latifrons grzegorzowicensis Kielan

Scutellum (Paralejurus) dormitzeri dormitzeri Barrande

Другие виды, как:

Otarion (Otarion) convexum (Hawle & Corda)

Leonaspis (Leonaspis) laportei (Hawle & Corda)

Acaste (Acastoides) paeckelmanni (R. & E. Richter)

не были до сих пор известны в Польше.

Публикация содержит сверх того описание трех новых видов:

Proetus (Proetus) papillaris n. sp.

Scharyia couviniana n. sp.

Asteropyge (Rhenops) jani n. sp.

Pl. I

Proetus (Proetus) papillaris n. sp.

Fig. 1. Holotype, cranidium, bed No. 6; × 5.
Fig. 2. Paratype, pygidium, bed No. 6; × 5.
Fig. 3. Paratype, cranidium with distinct ornamentation, bed No. 6; × 4.8

Proetus (Proetus) sp. *A*

Fig. 4 *a, b*. Complete specimens in two views, bed No. 5; × 2.6.

Proetus (Proetus) sp. *B*

Fig. 5 *a*. Cranidium, bed No. 5; × 5.7.
Fig. 5 *b*. Thorax and pygidium of same specimen; × 6.4.

Pl. II

Scharyia couviniana n. sp.

Fig. 1. Holotype, cranidium, bed No. 5; × 8.5.
Fig. 2. Paratype, pygidium, bed No. 5; × 7.2.

Acaste (Acastoides) paeckelmanni R. & E. Richter

Fig. 3. Cephalon with median lateral furrow (S_2) not extended to dorsal furrows, bed No. 4; × 4.

Fig. 4 *a*. Cephalon with median lateral furrow (S_2) extended to dorsal furrows, bed No. 4; × 4.5.
Fig. 4 *b*. Same specimen, side view; × 4.5.
Fig. 5. Pygidium, bed No. 5; × 5.

Scutellum (Paralejurus) dormitzeri dormitzeri Barrande

Fig. 6. Cranidium, bed No. 7; × 3.2.

Scutellum (Scutellum) sp.

Fig. 7. Pygidium, bed No. 5; × 5.1.

Pl. III

Phacops (Phacops) latifrons grzegorzowicensis Kielan

Fig. 1. Cephalon and fragment of thorax, bed No. 6; nat. size.
Fig. 2. Internal mould of cephalon, bed No. 3; × 5.

Cyrtosymbole? sp.

Fig. 3. Cranidium, bed No. 7; × 19.4.

Otarion (Otarion) convexum (Hawle & Corda)

Fig. 4. Cranidium, bed No. 5; × 5.5.

Otarion (Otarion) polonicum praecedens Kielan

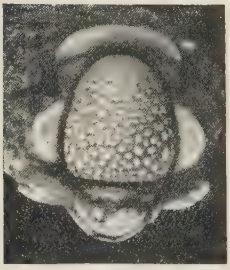
Fig. 5. Cephalon, bed No. 5; × 5.

Asteropyge (Rhenops) jani n. sp.

Fig. 6. Holotype, cephalon, bed No. 5; × 6.7.
Fig. 7. Eye lobe, bed No. 5; × 6.2.

Leonaspis (Leonaspis) laportei (Hawle & Corda)

Fig. 8. Cranidium, bed No. 6; × 5.1.



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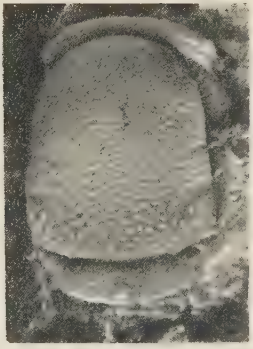

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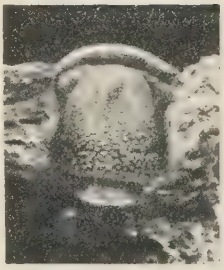

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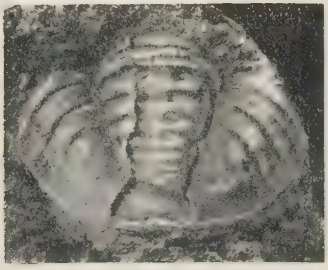
5 b



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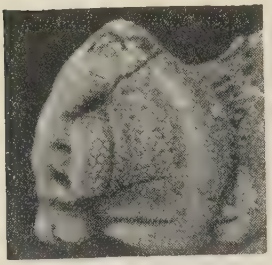
4 a

4 b



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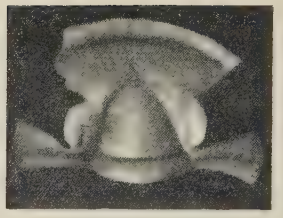

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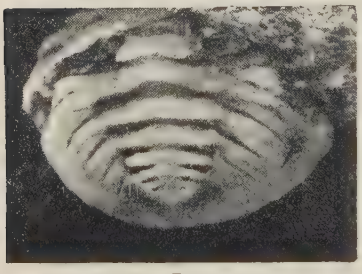

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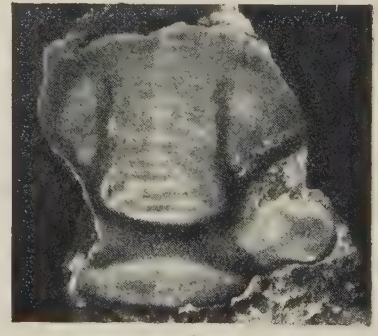

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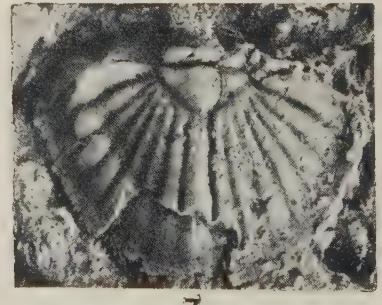
4 a



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7

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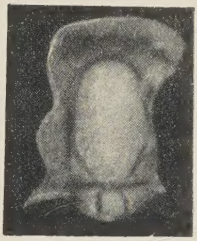

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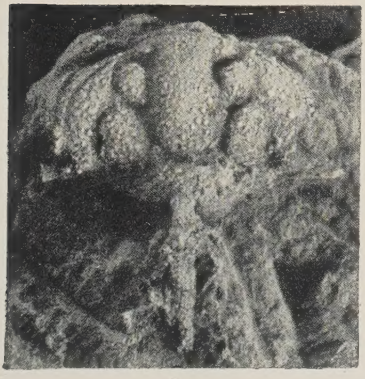

8

2

Cena zł. 30.—

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